DOCUMENT RESUME

ED 152 993 CE 015 217

AUTHOR Ansell, Sherman D., Ed.
TITLE Proceedings of the VTAE Leadership Conference on Energy Use and Occupational Impacts (Madison, Wisconsin, February 15-16, 1977).
INSTITUTION Wisconsin State Board of Vocational, Technical, and Adult Education, Madison.
PUB DATE Feb 77
NOTE 56p.

EDRS PRICE MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS *Adult Education; Conferences; Economic Change; *Energy; Job Market; Occupations; *Policy Formation; Public Policy; Speeches; *Vocational Education
IDENTIFIERS *New Careers

ABSTRACT

Proceedings are presented of a two-day conference in which Wisconsin vocational and adult educators examined the energy crisis in light of programs in vocational, technical, and adult education in order to adapt to the changes expected in the job market. Major contents are (1) the keynote address by Governor Burt Zien on "The Role of the State in Setting Policy to Meet Energy Needs"; (2) summary symposium presentations on "Energy Alternatives and Emerging Technical Occupations" covering solar, nuclear, fossil fuel, and wind energy; (3) an address by Robert Bauer entitled "Energy Problems and Viable Solutions"; and a panel discussion, "Implications for Energy Users," with summaries of individual presentations on agriculture, labor, industry, and consumers. Summaries are also included of five workshops on energy use and occupational training in agriculture and food production, transportation, construction trends, technical assistance to industry, family and property management, and industrial and educational facilities. (JT)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED152993

Proceedings of the

WISCONSIN VTAE LEADERSHIP CONFERENCE ON ENERGY USE AND OCCUPATIONAL IMPACTS

February 15-16, 1977
Madison, Wisconsin

Conference funded by the

Wisconsin Board of Vocational, Technical and Adult Education
Eugene Lehrmann, State Director

Edited by

Sherman D. Ansell, Conference Chairman and Vocational Education
Consultant, Research -- WBVTAE

Planning for this conference was done by the WBVTAE staff Energy Committee:

Sherman Ansell
Robert Bachmann
Harlan Klintworth
Donald Knudson
Fred Leighton
Allen Linster
Otis Pahlberg
Christine Nickel
Arnold Potthast
Linda Taylor

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Sherman D. Ansell

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

CE 015 217

Presenters and Resource People

Sherman Ansell, Consultant-Research WBVTAE, Madison

Robert Bachmann, Business and Industrial Liaison, WBVTAE, Madison

Robert Bauer, Manager, Chicago Office, U.S. Energy Research and Development Administration, Chicago, IL

Theodore Brevik, Professor, Agricultural Engineering, Univ. of Wisconsin Extension, Madison

Donald Brill, Assistant State Director, WBVTAE, Madison

Lynndon Brooks, Associate Professor, Agricultural Engineering, Univ. of Wisconsin Extension, Madison

Russell Dutcher, Chairman, Department of Geology, Southern Illinois Univ., Carbondale, Illinois

Glenn Groth, President, Sun Stone Solar Energy Equipment, Sheboygan

M. Janice Hogan, Associate Professor, Department of Family Social Science, Univ. of Minnesota, St. Paul, MN

C. Phillip Johnson, President, Wisconsin Board of Vocational, Technical and Adult Education, Madison

Susumu Karaki, Assoc. Director, Solar Energy Applications Laboratory, Colorado State Univ., Fort Collins, Colorado

Harlan Klintworth, Consultant-Trade and Industry, WBVTAE, Madison

Ken Knapp, Consolidated Papers, Inc. Wisconsin Rapids, Wisconsin

Donald Knudson, Architect, WBVTAE, Madison

Allen Linster, Consultant-Agriculture, WBVTAE, Madison

Patrick Lucey, Governor, State of Wisconsin, Madison

Otis Mehlberg, Consultant-Industrial Safety, WBVTAE, Madison

Christine Nickel, Consultant-Home Economics, WBVTAE, Madison

Arnold Potthast, Chief, Trade and Industry, WBVTAE, Madison

Warren St. John, Engineer Consultant of Manufacturing Services, Allis-Chalmers, Milwaukee, Wisconsin

John Schmitt, President, Wisconsin State AFL-CIO, Milwaukee, Wisconsin

Peter Starkweather, Vice President, Flad and Associates, Madison

Richard Taube, Chief, Policy and Goal Analysis Section, Wis. Department of Transportation, Madison

William Vogelsang, Professor, Department of Nuclear Engineering, Univ. of Wisconsin, Madison

Russell Weisensel, Exec. Director, Wisconsin Agri-Business Council, Madison

Benjamin Wolff, Director of Research, Windworks, Mukwonago, Wisconsin

Burt Zien, General Manager, Zien Mechanical Contractors, Milwaukee, and member of the WBVTAE

Proceedings of the
Wisconsin VTAE Leadership Conference on Energy Use and Occupational Impacts
February 15-16, 1977
Madison, Wisconsin

TABLE OF CONTENTS

	Page
Greetings, C. Phillip Johnson	1
Purposes of the Conference, Donald Brill	4
Keynote Address	
Introduction of the Governor, Burt Zien	6
The Role of the State in Setting Policy to Meet Energy Needs, Governor Patrick J. Lucey	8
Symposium: Energy Alternatives and Emerging Technical Occupations	
Solar Energy, Glenn Groth	19
Nuclear Energy, William Vogelsang	20
Fossil Fuels Energy, Russell Dutcher	23
Wind Energy, Benjamin Wolff	25
Energy Problems and Viable Solutions, Robert Bauer	27
Panel: Implications for Energy Users	
Agriculture, Russell Weisensel	29
Labor, John Schmitt	31
Industry, Warren St. John	35
Consumers, M. Janice Hogan	39
Workshops on Energy Use and Occupational Training	
Agriculture and Food Production Workshop, Allen Linster	42
Transportation Workshop, Otis Mehlberg	44
Construction Trends Workshop, Harlan Klintworth	46
Technical Assistance to Industry Workshop, Robert Bachmann	47
Family and Property Management Workshop, Christine Nickel	49
Industrial and Educational Facilities Workshop, Donald Knudson	51
The Role of VTAE in Technology Transfer, C. Phillip Johnson	52
Concluding Remarks, Sherman Ansell	54

VTAE Leadership Conference on Energy Use and Occupational Impacts

GREETINGS

Speaker: C. Phillip Johnson, President, Wisconsin Board of Vocational, Technical and Adult Education

"It gives me great pleasure to welcome Gov. Lucey and distinguished guests to our leadership conference on energy and occupational impact. On behalf of the State Board, I am most pleased to see the wide interest that we have at this particular conference. I am sure that it has to be one of the top topics, not only in the State of Wisconsin, but across the nation, and we are most pleased to have everybody attend. So with no further ado, I am happy to introduce Dr. Don Brill."

PURPOSES OF THE CONFERENCE

Speaker: Dr. Donald Brill, Assistant State Director, WBVTAE

Thank you Mr. Johnson. It's certainly a pleasure to have this moment materialize. Something that many of us feel has been extremely important, and it gives us an opportunity to address an issue that is long overdue.

The Developing Problem

It has taken our nation's universities, research laboratories, inventors and scientists about 100 years to develop the technology and processes which have dissipated our non-renewable resources and have polluted our environment. Equally as long, with the VTAE system playing a major role beginning 65 years ago, we have been training workers in these same technologies and processes. As key components in the engineering team, we have indeed changed the face of the earth and redirected the future of all mankind.

We now perceive earth in its true light, as a finite vessel with limited supplies hurtling through space without destination and with no place to refuel. The time which we have to change our life-styles, our habits and our technology is measured by the declining balance of our resources, estimated as short as 15 years in some critical components. This is complicated and perhaps even shortened by the problem of supply lines, national monopolies and the caprice of the market place. We have waited too long to assimilate these realities, to overcome the immediate cost benefit barriers and to buy time with the knowledge that we already have mastered.

Wisconsin's VTAE system is the delivery system which is in touch with the worker, whose habits and practices are the major product of our schools. With the cooperation of our sister agencies, we have a saturation capability for the delivery of the essential skills and knowledge in order to accomplish this massive task. We must accomplish an infusion of these knowledges and skills throughout the system, and thence, throughout the state.

While we debate the issue, our energy consumption has increased and our balance of trade has become less favorable. We are now aware that our dwindling time is our most precious commodity. We cannot engage in our usual developmental processes. We must implement the best measures at hand promptly to turn the deteriorating situation around. We cannot wait for the ultimate solution or the energy breakthroughs. They will be easily handled as they occur in the tradition of the system. We must now slow the energy clock, develop the awareness, the attitudes and the commitments in our policy makers, our administrators, our educational leaders and our educators.

Conference Activities

We are meeting as educators to examine the crisis in the life of the programs in vocational, technical and adult education in order to adapt to the changes which will surely take place in the job market. Course content must be modified because of fundamental changes in our traditional assumptions relating to energy. Our workshops today and tomorrow will delve into the short and long term significance of these realities and will result in a consciousness and attitude which will change behaviors and ultimately our life styles. We have represented in the group not only experts from across the country but able representatives from business, industry, labor, management, agriculture, government and education. We think that our energy committee has put together the right package. It remains for each of us to participate and to follow through.

Out of this conference should flow an improved energy audit for our own system; an improved perspective of the problem and our respective agency roles with enduring effects on our own attitudes and behaviors; an improved posture for technical assistance as we relate to our respective communities; and above all, from here on in, a technology transfer based upon realistic assumptions concerning energy and alternative energy sources. These are the purposes of our meeting at this conference. I think you will find that the format is appropriate to address this challenge. We have brought together these experts in a variety of areas who are on the cutting edge of the technology, who are keenly aware of the problems and who can best persuade and inspire those of us who have responsibility to transmit knowledge.

We are delighted to have with us today a member of our lay policy board, Mr. Burt Zien, who has been an advocate of alternative energy sources and has provided leadership in many ways. Mr. Zien is chairman and manager of the Zien Mechanical Contractors and his firm has been engaged specifically in experimental research and has piloted an experimental solar energy home presently in operation. So it is my distinct pleasure to introduce at this time Mr. Burt Zien who will introduce our keynote speaker.

INTRODUCTION OF THE GOVERNOR

Speaker: Burt Zien, Member, Wisconsin Board of Vocational, Technical and Adult Education

I am delighted to be here with all of you. I am particularly proud of the State of Wisconsin Board of Vocational, Technical and Adult Education, the fact that they have had the foresight to come together today, to plan for the next decade or two, the direction education must take as we begin to get involved in conservation and all of the implications of conservation -- the recycling, the conservation of energy, the conservation of how we spend our resources. We play a major part, the training through the vocational and technical system, in the future of Wisconsin and its adaptation to the crises that lie ahead of us. I think this is probably the first meeting of its kind anywhere in the state where you have come together to forecast the future and to adjust our programming for the working people of this state, and for those seeking careers in these very trying times. I want to make a few comments and then I would like to introduce the governor to you.

Fossil Fuels Formed

Geologists advise us that crude oil and natural gas were formed over a period of 800 million years. Their source is believed to be plant and animal life that sank into swamps and became covered with silt, mud and water. Heat and pressure from overlying layers of sediment converted the still-living plants and animals into a fossil fuel.

These fossil fuels rested within subterranean caverns of the earth -- unnoticed and unused -- until August 27, 1859, when E.L. Drake first discovered oil at a depth of 70 feet at Titusville, PA.

In 1920 American oil wells produced only 500 million barrels of oil. In 1930 U.S. oil production doubled over 1920, reaching 1 billion barrels. Peak production of 3½ billion barrels was reached in 1970. U.S. production has declined since 1970, slightly under 3 billion barrels. In 1976 America supplemented its needs by importing 2 billion barrels of additional oil from South America, Arabian countries and Canada, which represented 40% of our needs. We know that foreign oil sources are not guaranteed. High price escalation and boycott threats are dangerous probabilities. We cannot continue to always rely on foreign oil supplies.

Use of Energy

Those of you who are 37 years of age were born in 1940, a year in which there were 10 million automobiles on the road. Between 1940 and 1970 an incredible three decades, the number of automobiles increased to 120 million. In this period of time, energy consumption doubled every 8 years.

It took millions of years for the oil to develop, but we can't wait millions of years more for oil to develop underground. We've had the Atomic Age, the Jet Age, the Space Age, the Computer Age, all blossoming at once. These dynamic and youthful ages may be shortlived unless they receive a massive shot of Geritol -- Geritol in the form of new sources of energy.

We had better face up to the fact that the human race will be essentially out of oil and gas in 30 years -- even sooner if other nations try to emulate the U.S. of the past generation with its industrial growth. We have had a dramatic warning in the recent winter months. America is on a disaster course resulting from rapidly depleting energy reserves.

State Leadership

Fortunately, we have a Governor who is determined to develop a brighter energy future for Wisconsin and America. Governor Lucey anticipated this winter's energy crisis. He established a special energy watch-dog committee several years ago under the leadership of Charles Cichetti. In August, 1976 he personally participated in an all day energy resource review. Suppliers of natural gas, propane, coal, electricity, oil, nuclear power were called upon to evaluate their supply potential for 1976, 1977 and the decade. Representatives of Wisconsin's business, labor, agriculture and consumers were present to advise of the effect of energy shortages on their constituency. Governor Lucey has directed his Emergency Disaster Division, under the leadership of Ron San Felippo, to assist industry, consumers and more particularily, the poor who suffer because of natural gas and propane shortages in past winters, in maintaining an energy supply to keep them going.

Governor Lucey is on top of this; he has a big job ahead of him, and we all have to work with him. It is with great pleasure that I introduce Governor Lucey who speaks to you on "The Role of the State in Setting Policy to Meet Energy Needs."

Keynote Address

THE ROLE OF THE STATE IN SETTING POLICY TO MEET ENERGY NEEDS

Speaker: The Honorable Patrick J. Lucey, Governor, State of Wisconsin

Thank you Burt, Mr. Johnson, Dr. Brill and ladies and gentlemen.

I think the problems probably have been outlined already by Burt Zien so I can concentrate pretty much on the solutions, which is really the harder part. Nevertheless, I would like to devote a few minutes to that. When I finish my formal remarks I would be happy to open the meeting up to questions or comments that anyone has to offer.

Supply and Demand

I think this whole business of energy comes down to a matter, as with any economic problem, to the matter of supply and demand. We have already, as outlined by Burt Zien, a very finite supply, one that is being depleted in our lifetime at an alarming rate. Therefore, our chief concentration has to be on the demand side of the equation, what can we do to reduce our consumption, what can we do to conserve?

I would like to talk a little bit about both in terms of Wisconsin and Wisconsin's future, of what can we do in the area of conservation and what can we do in the area of supply. In looking at the conservation picture I think we have to put it in context. Some of the statistics I am going to use have been used over and over again but perhaps they bear repeating.

Comparable Standards

When you are looking around for comparables, you look to other countries that have a reasonably comparable standard of living. You look to Sweden, to West Germany, you look to Switzerland. In each of those instances you find a standard of living very comparable to our own. And yet you will find the per capita energy consumption runs 1/3 to 1/2 of what ours does. A recent study on Sweden indicates that for each dollar of gross national product that they produce, the energy investment in that dollar of gross national product is roughly 60% of what it is to produce the same amount of gross national product here in the United States. And yet Sweden enjoys a very comfortable standard of living.

Another figure that is used frequently, and I think it is entirely valid, is that the amount of energy that we waste that we could conserve is roughly equal to the total energy consumption of Japan. Here is a country with half as many people as the United States, tightly situated on a land area about equivalent to California, but a country that has pulled off a miracle in terms of industrial productivity. But it is doing it because it is so dependent on imports for its energy. It is forced by the economic facts of life to produce at tremendous industrial output and much of it very energy intensive on just about the amount of energy we waste unnecessarily in this country.

What can we do about it? I think there are a great many things we can do. Certainly as far as state government is concerned, including the voc-tech system and the university, is to set a good example. We can attempt to conserve wherever we can. And while we have been doing this for quite some time now, in fact we started a year before the Arab oil boycott, we find that there is still room for further belt tightening.

An example is one I released over the weekend, indicating that in the two major office complexes that we have here in Madison, GEOF I downtown and the Hill Farms Complex, that in one week by simply turning down the thermostats and using a few other very elementary rules of conservation, we were able to conserve an additional 20% to 23% for that week. That represented a savings, if we continue on that basis, of a very substantial amount of energy for the balance of this year. Enough to heat a few thousand homes. As a matter of fact, if the rest of our economy were to follow that example, and not that they would reduce their energy consumption by 20% or 23% because that is pretty dramatic, but if they would just do the things we have done, it is estimated that for the balance of this winter, an additional 330,000 homes could be heated with the available supply that we have to draw down upon.

Boycott Impacts

We went through the Arab boycott in 1973 and there was a lot of pounding of chests and a lot of new resolutions about what we could do. But as you look back upon it, about all we have to show for that period is the 55 mile per hour speed limit. It has saved some gasoline and it has saved quite a few lives. But when you travel across the United States and see the spotiness with which the 55 mph speed limit is enforced; when you look at our gasoline consumption here in Wisconsin and realize that even with the deterrent of 55 mph, people are driving more and that our gasoline consumption went up sharply last year almost equal to the traditional pattern of growth in gasoline consumption, you have to come to the conclusion that in terms of long term reform, we profited very little from the disguised blessing of the embargo. Now we have this winter that is 26% lower than last year and 20% below normal, and again we are reacting about the same way. But I would hope that while all of this is still fresh in our minds, the minor inconveniences that we have suffered, an awareness of the real hardships suffered by citizens of Ohio, Pennsylvania, New York, and elsewhere, that we would make a concerted effort to use this period of crisis to ensure that the net effect, the long term effect, would be one of dramatic and lasting reform rather than a temporary contrition and then a tendency to fall back into our same wasteful patterns after the emergency seems to have passed.

I think that one of the things that has already come to light from this present crisis is that people finally are beginning to accept the fact that the crisis, the energy shortage, is for real and is permanent. Before we recognized that the boycott itself was a contrivance. Now you hear some talk that while there are some capped gas wells in Texas and elsewhere, and perhaps there are, and Howard Metzembum is conducting what I am sure will be a very thorough investigation in the United States Senate to see whether or not that is true. But really we don't have to wait for the results of that study because whether it is true or whether it is false that these wells are capped, the energy shortage is for real. If they are capped, it simply means that some energy

that we might have liked to consume this winter, will be consumed at higher prices in 1980 or 1981, but it means it will be there then and we can consume it then and somebody will make more profit on it.

Resources are Finite

But the main fact, the fact that I think has finally come home to all of us, and a Harris poll was released yesterday which seems to indicate that, that people are finally beginning to accept the fact included in the introductory remarks that Burt Zien made this afternoon, that we are consuming finite resources, resources that took millions of years to develop and which are not replaceable -- once they are gone, they are gone. And the people my age (I don't know why Burt picked on the people who are 37), but the people my age and his age, if we live for four score or something less than that, will have had the dubious honor of using up I think something like 80 or 90 percent of the known reserves of petroleum, during our lifetime.

And if you draw a chart going back to the year of 0 A.D. or year 1 A.D. and bring it up to the year 2000, it is a very dramatic chart. In terms of petroleum consumption, it is at 0 level until it was discovered less than 100 years ago, and then a sharp rise for about a 70 year period, and then it drops down very low indeed because we are going to be out. The most optimistic projections indicate that even the Persian Gulf will be out of oil very early in the 21st century.

Effecting Conservation Measures

So what can we do right now while the opportunity exists, while people are still aware of cold weather and what it has done to their heating bills? What can we do to effect some conservation? Well, a few of the things that we have tried to urge upon the legislature are these. We suggested again, for the third or fourth time, that we ought to restrict the sale of air conditioners to those that are energy efficient. We can reduce the consumption of energy in cooling air by 50% simply by requiring that efficient and only efficient air conditioners be purchased and sold in Wisconsin. By 1990 it is estimated that the saving would be the equivalent of the amount necessary to heat 24,000 homes. It would eliminate the need for either 10 small oil fueled electric generating plants or 1 huge nuclear plant. We group these because when you are talking about room air conditioners, you are really talking about peak load appliances. And that is the most costly kind of electrical energy because it has to be added to the supply at the base plants. Usually it is produced, under present standards at least, with natural gas or with petroleum, the scarcer sources of energy, and the most costly methods of generating electricity.

We can eliminate pilot lights, pilot lights on the gas furnaces and pilot lights on appliances generally. In doing so we would save enough energy to heat 170,000 homes. Simply replace the pilot light with an electric ignition device. It is estimated that a kitchen range uses up roughly 30-40% of the energy that it consumes just in burning the pilot light for no other useful purpose than to save us the inconvenience of scratching a kitchen match. By the same token, most of us leave our pilot lights on in our furnaces all summer long just so we don't have to go down or have the furnace man come around in September or early October to relight the pilot light.

Public Service Commission

We have attempted through the public service commission to make sure that the rates for electricity are based on time-of-day. This would tend to reduce the need for producing electricity for peak loads and to reward those users of electricity in the off-peak periods. Some industrial plants in Wisconsin have already converted so that their main energy consumption is on the 2nd or 3rd shift rather than on the first shift. We are now asking, through the Attorney General, to be represented before the Public Service Commission to support adoption of roughly the same principles in the fixing of rates for the consumption of natural gas. I think this is going to be the kind of model legislation or model regulation that will be picked up by regulatory agencies across this country. But more than that I think it is important that we demand of our utilities that they recognize what their role is: not to see how much gas or how much electricity they can sell, but rather to provide a service, the service of a warm or cool room, the service of the ability to cook a hot meal; and that they become part and parcel of a conservation effort, that they be forced into a situation where they are making an effort to help the consumer reduce his consumption of these precious resources.

I think that the government and the utilities have to unite in this effort. One of the areas that I have been very concerned about is the consumption of energy for the heating and cooling of enclosed space, and we know that a great deal needs to be done in our codes, both for commercial and industrial buildings and for residential property, one and two family houses. Would you believe that since 1971 we have conducted a drive, that took until just about a year ago, to get through the legislature bills to provide for the certification of manufactured homes and for uniform building codes for conventionally built homes in order to ensure that proper energy conservation measures were included in those buildings. By the same token we have worked with DILHR to get new codes adopted there for commercial and industrial buildings, and while there are some technical problems, we are finally making some progress in that regard.

Alternate Energy Projects

What about alternate sources of energy? There are some sources of energy that do regenerate themselves such as solar energy and wind. In the area of solar energy we do have up at Arlington an experimental residence, an experimental farm there, that is now being heated with solar energy. In the capital budget that I will be submitting to the legislature later this month, we have a $900,000 item; $400,000 of that is for specific proposals in state buildings. One I think that offers great promise is to require that instead of using steam from a central power plant to supply hot steam solely to heat tap water during the summer months, that we put a device on the roof of that building and use solar energy for the heating of tap water. I am sure it is terribly wasteful the way we are doing it now by running those underground steam pipes all summer long. This is an area where we ought to get a very quick payback by using solar energy.

Whether the match comes from a private foundation or from a local unit of government, or whether it comes from the feds, we will put up $500,000 of state funding for matching money. The building commission will be the final judge of which projects we want to invest in. The decision will be made, of course, on the basis of which ones are most likely to ensure a quick payback.

The Dairyland Coop is studying the use of wind. This is not anything very new or revolutionary, but it seems that maybe the farmers were pretty smart in having their windmills and maybe we ought to get back to them. I am glad to see that the Dairyland Coop is involved in this effort.

Energy Efficiency in Industry

What can we do about greater energy efficiency in industry? It is difficult to pass laws that impose on them. Certainly the market place is going to be a very strong factor encouraging greater energy efficiency. I walked through a rubber plant up in Eau Claire 2 or 3 years ago. That plant has equipment which, by comparison to other plants owned by the same company, might be regarded as obsolete. Yet it was still continuing on a competitive basis because they had made a sort of a textbook example of that factory by going through and monitoring it in such a way that they conserved energy wherever they possibly could. They even blew thick plastic insulation into the openings of non-operating windows. They checked every steam pipe and every other pipe that conveyed any kind of material at above room temperature to see whether or not there was any leaking from that pipe. As a result, that tire manufacturing plant stayed in production, whereas if they hadn't taken these rather drastic measures of energy conservation, they would have been out of production. I think that is the kind of example I would hope other industries here in Wisconsin would look at.

Increasing Traditional Energy Sources

What can we do in terms of increasing our supply of our traditional sources of energy? Well, not as much as we would like to do. We are not an energy producing state. Someone once said that the only sources of energy that we have are the cooling waters of Lake Michigan, and it almost comes down to that. But there are a few things that we can do to make sure at least that we get our fair share. I remember some years ago meeting with the governors of the midwest to try to get the midwest governors to go on record in support of the trans-Canadian rather than the trans-Alaskan pipeline to get the oil from the north slope down to the central part of the United States instead of bringing it into California where they didn't need it. I couldn't even get a majority of the midwest governors to vote for that. Needless to say, when I went before a national governors conference, I was even less successful.

Now that the trans-Alaskan pipeline has proved to be such an outrageous disaster, they're taking a little harder look at the question of how they are going to get the natural gas from the north slope to the lower 48. I can report there that we are making some progress in the right direction. I worked very closely all of last year with Fritz Mondale when he was still a senator and he was supporting and offering a procedural bill. A bill that was neutral in terms of the outcome but simply set up the timetable by which the federal government would have to resolve the question of how we were going to bring the natural gas from the north slope. That procedural bill passed in the nick of time, partly because Charles Cichetti went right down there and negotiated with some of the senators who had conflicting

points of view. But that bill requires that the FCC act on this matter to get it to the President by July, and the President has something like 60 days in which to make a determination.

The best bit of news on that whole question was the decision about two weeks ago by an administrative law judge and the federal power commission that said, very categorically, the fact that natural gas ought to be brought through a trans-Canadian pipeline. This was consistent with previous recommendations of the staff of the federal power commission, and now I think it can be safely assumed that the full commission will reflect the attitudes of the staff and the administrative law judge. With that kind of recommendation, I would hope that we could be persuasive with the White House in getting the President to act in our favor. If that happens it means that about 10% of our requirements for the next ten years would be supplied from the north slope of Alaska. It will mean that the United States will not compound the error of the trans-Alaskan oil pipeline by running a parallel natural gas pipeline with the gas having to be liquified, then loaded aboard ships, brought down through some very dangerous straits, down the west coast of the United States, to be restored to its natural state, put into pipelines and then shipped across the continent to where it is needed.

I think that finally we are pounding some common sense into the people in Washington, and I am very hopeful and very optimistic that the arctic route will be selected by the President and the Congress. At least we will have fair access to that resource. But that is something that is 4 or 5 years away; in the meantime, it doesn't solve our immediate problems which I think only can be solved by good common sense type of conservation on the part of all of us. And so with that, I would like to invite your questions and comments.

Questions and Answers

Burt Zien, Moderator: Governor, I would like to comment on one thing you said, and that is the statement about domestic hot water. I think every state building should immediately proceed to investigate that area to find out whether they can do it, because it can be done, it is practical, it actually is economical to do so. There are vast savings to be made in that area.

Governor: We are going to put in one just as soon as we can get the legislature to approve it.

Question: What state laws or regulations are available now so that either certain groups, or some unions, or whatever might contest the fact that by lowering temperatures you can't work or you won't work? How much contesting might be expected?

Governor: Well, so far we have not had any problem and I think we have as alert and as aggressive a leadership of our public employees' unions as is true of any union in the state of Wisconsin. The temperature in state office buildings heated with natural gas is kept at 63 degrees and buildings heated with coal at 65 degrees. Tom King has been invited to come to my office to see that the Executive Office is in compliance. He has not been in and we have not had any difficulty in that regard so far.

Question: You have given your plan for legislation. What is your plan for education rather than legislation? For example: conservation. Conservation can only take effect through education. Do you have plans for the State to educate the young generation so they can learn to conserve without legislation?

Governor: Number one, I think that the very fact of this conference is some indication of our commitment to exert all the persuasion we can with the educational establishment to create a conservation ethic among our young people. But education is a slow process. We can't wait until we produce another generation of young people who have learned the lesson of conservation. I think we have to do that, but while we are doing that we had better conserve the natural resources that are available to us or we will fail to stretch out the period, when those resources are available, long enough for the next generation to take over and to develop alternate sources of fuel.

Question: Milwaukee area building codes do not allow construction of wood frame houses with 2 x 6 studs on 24 inch centers with room for 6 inches of insulation in the outside wall. I know there is a building code updating going on at this time, and would like to know if a provision will be made for this?

Governor: You are convinced that you are better off with a 6 inch blanket rather than something like styrofoam that is more compact. Let me look into that.

Comment: The savings in lumber could be put into insulation.

Question: Realizing that it is going to cost more money to insulate our houses and to use other forms of energy saving devices such as solar energy, what kind of tax incentive programs do you think we might have, or don't you recommend that?

Governor: I was recently looking over a report that was submitted to me about a year ago by a task force that we created, and they had a number of areas where they suggested tax incentives. Two things I see wrong with tax incentives are that, one, in terms of property tax incentives, we have a uniformity clause in our State constitution. If the local assessor, for example, when you spend $2500 over the cost of a conventional furnace to put in solar heating, should wish to simply wink at that and not count it in the assessed valuation of that property, under our constitution, he just couldn't do that, it would be unconstitutional. The other thing in looking at it in a broader picture of the use of tax incentives, say for industry, tax incentives come down really to tax spending and the only difference from the tax spending and appropriation spending is that in the case of appropriation spending you collect the tax and you bring it into the government coffers with some administrative costs and then you shell it out again for that taxpayer and other taxpayers. But tax spending is sometimes not viewed with as much scrutiny as appropriations spending because the taxpayer keeps the money. I think that sometimes we are inclined to be less critical of tax incentives because the money doesn't come in and go out. I think that sometimes we use a sort of shotgun instead of a rifle approach and we will offer a tax incentive to get people to do something that they are going to do anyway because of economic necessity.

You also run into the problem that if you've got a very wealthy producer of a product and you offer him a tax incentive and he is in a pretty high bracket, he has got a very strong incentive to do that. Well, he may have a competitor that is just eking out a bare existence and perhaps has a greater need to make the additional capital expenditure than his wealthy competitor, but the tax incentive doesn't help him at all because he is not paying much of any tax. In that case if you had had appropriated expenditures for that purpose, you might go to the guy where he can't do it unless he gets some government help and give him that help, and overall it would cost a lot less and you get the money where it does the most good.

Question: I've seen in our own industry, and particularly our own company, that once you inform the people on what they can do and how to go about it in simple measures and what it really means--how many gallons, or how many dollars it takes. Then these things become automatic; they put them into effect. I wonder if the State has any plan like that, to develop an educational process, an office that might promote education in the area of energy conservation?

Governor: I think that would be a very good subject for a workshop at this conference if you can fit it in. Because here you are dealing with the voc-tech system, and if there is any branch of our whole educational system that ought to be working hand-and-glove with industry, it is the voc-tech system. I think it might be very well to try to devise a program where voc-tech districts would provide that kind of course for industrial workers and for middle management in the paper industry and other industries that are energy intensive.

Question: You have been commenting about alternative sources. Would you comment on the potential for methane generation in our agricultural-oriented state?

Governor: I am really not very expert on that; I have read a few brief articles about it, and I understand that manure can be converted to methane gas and it would appear that some very remarkable results can be achieved, but I am sure there is someone here that is better informed on that subject than I am. I notice Steve Born in the audience and I would hope as the day goes on that all of you would make good use of his knowledge in this area as a resource.

Question: We haven't allowed 65 foot trucks or double bottom trucks in Wisconsin, and from what I understand this could be a tremendous energy saving legislation. Have you changed your stand on this at all?

Governor: No, I have not. As a matter of fact, the legislature doesn't need my vote or my signature to approve 65 foot trucks. Any time that they pass a joint resolution mandating double bottom trucks for 4 lane highways, the Secretary of Transportation has no choice but to carry out that legislation intent. That matter is before the U.S. Supreme Court now because the trucking industry raises a question that apparently has enough validity that the court has agreed to hear the case, that their constitutional rights are being violated because by permit we authorize other kinds of 65 foot vehicles that we have not been willing to grant permits to trucks. So I think really it comes down to the matter of a resolution; it doesn't require legislation or action by the court. I have

not always been persuaded on some of the arguments made on energy efficiency either for double bottom trucks or for heavier trucks. I question the wisdom of the Congress in approving the 80,000 pound weight. We have lifted the state restriction and permitted 80,000 pounds for trucks hauling fuel during the energy crisis, taking into account the fact that the ground underneath the concrete right now is pretty solid anyway so it doesn't do a great deal of damage. I think we have got to look awfully hard at what our highways are capable of handling, before we just willy-nilly increase weight limits on trucks. I think also that wherever possible we ought to be encouraging more and more use, at least for freight if not for passengers, of rail because we know in terms of energy efficiency, for long hauls particularly, rail is several times as energy efficient as truck transported cargo.

Burt Zien, Moderator: Just last August we finished building a solar home. I wanted to just tell you that help is needed to encourage people to invest. This home is a $40,000 home with 1400 square feet. Additional cost for insulation and solar equipment amounted to about $10,000. Solar energy is decentralized, it is not like a big power plant located along the shores of Lake Michigan. Everybody can do it under certain circumstances. It would seem to me that the legislature should give very serious thought to somehow or other encouraging, somewhat similar to the defamed oil depletion allowance, but nonetheless some kind of encouragement to spend that extra dollar to build a solar home. I must tell you that the results of the winter study on our home which I got last week, indicated that for the heat of natural gas for a neighbor that had the same home, the cost of operation for our home was 31% less where we used only electricity to operate the heat pump in conjunction with the sun. So the operating cost was 31% lower, but our capital costs were considerable. We did this as an experiment; we were not trying to make any profit on it. I think the legislature must give this some very serious consideration. There must be some way to get around the constitution.

Question: You were advocating appropriation and expenditure of public money and responsibility for technical development by the federal government. You have $900,000 in the State budget. Do you see the State getting more active in that area?

Governor: I think it is entirely possible. I think this $900,000 item in our capital budget is significant in that it is a first. Now it may be we will want to go beyond that in subsequent budgets; maybe the legislature will want to go beyond it in this budget. We can't just plunge into these things all at once, and I think this $900,000 ought to fund some very significant programs and I think that all we can hope to do with that kind of money is to provide pilot projects rather than resulting in a sweeping change where a whole community would go to solar energy or something like that. But at least it is a step in the right direction. It is true that in terms of funding capability we can't compete with the feds. I think we can provide leadership and set an example but in the long run if there is to be very heavy funding in this area, it is going to have to come in a large part from the federal government.

Question: I am not sure about Mr. Born's position, but I know Mr. Cichetti, when he was in charge of the energy department in the state of Wisconsin, he advocated very strong controls on fuel prices. It seems to me that the route to go would be to de-regulate prices, perhaps with an excess profits tax, because if they could seek their natural level there would be more incentive to conserve, there would be more alternate fuel sources, such as methane gas that we mentioned. As long as we have prices extremely low compared to the recreation value, isn't this a de-incentive to save energy?

Governor: You are talking about deregulation of natural gas. I don't think Charlie has been adamant about that. With certain safeguards, at one point he and I made a trip to Washington to support phased deregulation. Of course, natural gas is the only item involved here, new oil is under some price control, but I think in terms of the utilities at the state level that you have to continue to have price regulation because by their very nature they are monopolies, and if they aren't regulated then there is just no control at all. But I think in general that you are right; that the price mechanism is going to have to enter the picture in order to get people to conserve. It is a very painful way to do it and it is a form of rationing really; rationing on the basis of ability to pay which is not always the most equitable or democratic kind of rationing that we ought to recommend. But certainly that is coming, there is no question about it.

Question: I think that there's a loophole on electrical energy costs in the form of surcharges for fuel costs. Let's take for example Marshfield where I live. Coal went up $4.00 per ton, and light bills jumped by three fourths of the whole bill. Where's the rest of the profits going? Why are they able to bypass price controls?

Governor: I don't know how the Marshfield electricity is produced, whether it is a coal plant or a nuclear plant, or oil. I don't know the answer to that, I am sure the Public Service Commission can explain. They are not bypassing Public Service Commission controls. There is a pass through on the cost of fuel. I think it would be very useful if you had a person from the Public Service Commission on your program, so they can explain the whole business of regulating. I would hate to be a member of the Public Service Commission in any state where public service commissioners are elected. I suspect in these times everyone of them gets defeated when he comes up for re-election. It is so difficult to justify the kinds of rate increases that they have to authorize and yet by statute it says that they have to approve rate structures to ensure reasonable returns to the investors. That is the free enterprise system. There is no way that one state regulatory agency can impose price controls at the retail level to counteract the quadrupling of the price of crude oil on the world market. Yet that is the kind of bind that they find themselves in. I think our Public Service Commission does very well but it is certainly not a very popular role to fill right now.

Question: In regard to the vehicle taxation increase in licensing, has anything been done to encourage periodic maintenance or vehicle inspection for efficient operation of cars and trucks?

Governor: No, I don't think there is anything in the transportation bill from the standpoint of energy efficiency. I realize how important operating efficiency is. It is true that we would be the first state in the nation, if the legislature approves the bill as presented, that will determine the price of license plate fees for automobiles based on energy efficiency. The schedule will be based on EPA ratings.

Question: Has there been any consideration given to putting state employees on a four day week?

Governor: There has been some consideration of it. But we have not done so. I even had a meeting with the Governor of Minnesota where they have done that and he explained some of the problems that have occurred in going to the 4-day week. Such things as somebody in a regulatory capacity during a part of that 10 hour day he can't reach any of the people he is supposed to regulate, they have gone home already. The fact that if you turn down the thermostat to 63 degrees and you have to keep it at 50-55 when the building is vacant, the saving isn't quite as great as if you had it at 70 degrees and you cut it down to 50 degrees. So all of those things have to be taken into consideration. We considered very seriously 3 weeks ago declaring a state of emergency in Wisconsin and then we could have mandated a lot of the things that we have been trying to persuade people to do. Our statutes are pretty clear that the governor has the power to declare an emergency. Once he declares an emergency he has extraordinary powers. But he can only declare an emergency if in fact there is an enemy action, and I haven't detected any of that, or a natural or manmade disaster. Sub-zero temperatures for 6 weeks running cumulatively might be described as a natural disaster, I am not quite sure, but I felt that rather than declare an emergency and have someone challenge it, and maybe having it reversed in court, it was better to go by more persuasion and try to get through as best as we can. With a little cooperation from the weatherman so far we are in pretty good shape. I am sure that if we had the kind of disaster as has occurred in Ohio or Pennsylvania or some other states, we would have had to, and rightly, declared a state of emergency and then have gone to a 4-day week.

Wisconsin Utility Performance

I might just say because I don't often have occasion to pay compliments to the utility executives, but I think that credit is due to the utilities that serve Wisconsin in this regard. The impression I get of what went on in the eastern states was that for years as a promotional device, utilities salesmen were going out and saying to industrialists, "we fit your plant for natural gas, we will sell you gas at the interruptable rate, we have been in the business for 15 years, we have never had to interrupt anyone's service yet, you can pretty well count on it that nothing is going to happen to you." So they used it in promotional devices and they got all these people on line. Whereas in Wisconsin the utilities which provided natural gas required a re-certification each year of interruptable customers, industrial customers, certifying that they in fact had an alternate fuel available. So when they got cut off in Wisconsin they shifted to propane if they had to, or they went to oil or to coal, and they kept on employing their men. I think the peak layoff that we had, except for Janesville which had their General Motors plant shut down not because of energy shortage but because they couldn't get parts from the east coast, we had about 1500 to 2000 people that were laid off because of the energy shortage. That is a remarkable record; it is much better than any of our neighboring states. I think the reason was the foresight of the utility executives in making sure that an alternate fuel was in fact available.

SYMPOSIUM: Energy Alternatives and Emerging Technical Occupations

SOLAR ENERGY

Speaker: Glenn Groth, President, Sun Stone Solar Energy Equipment, Sheboygan, Wisconsin

(Summary)

Solar energy has applications not only for home heating, but also for drying of corn, grain and lumber, and for frost protection in fruit groves. It requires new expertise in technical aspects of installation and use of the equipment. Its potential is immense, however. If all the solar energy falling on the earth in a three-day period could be collected and stored, it would supply all the energy we have ever had or will ever get from the "traditional" fuels. Such collection is impossible, of course, but the implications are obvious. Solar energy is here now, and will be available for a long time to come.

Types of Solar Systems

Systems using solar energy can be broken roughly into two groups: active and passive systems. Passive systems do not require an input of non-solar energy. Typical are dropping panels to expose collectors in daylight and to cover them at night to prevent the re-radiation of heat in the winter. In hot summer weather, this might be reversed so that the collectors are covered during sunlight and then exposed at night to dissipate heat.

Active systems have mechanical pumps, air handlers and heat pumps, and utilize existing technology. Liquid systems have to be designed to prevent problems with freezing in winter, boiling in summer, corrosion due to the heat transfer fluid and leakage. Air systems include collectors and sensors on the roof and storage capability, frequently in the basement. Differential temperature controls determine whether heat is being extracted from storage or is being added to storage.

Impact of Solar Energy

Construction trades such as masonry, carpentry, sheet metal, insulation, plumbing, electrical and heating, ventilating and air conditioning are involved with the installation of solar systems. There is a need to train draftsmen in the proper layout of ductwork and design of storage bins. Mechanical equipment installers will have to be trained in heat loss calculations for proper sizing of equipment. Others such as office personnel will be affected by the changes in environment control, marketing, sales and data processing. By 1980, it is estimated that solar heating systems will be a $1.5 billion sales market.

NUCLEAR ENERGY

Speaker: Professor William Vogelsang, Department of Nuclear Engineering, University of Wisconsin, Madison

(Summary)

The subject of my talk is nuclear energy; what place it has in the energy fabric of the country or the state; and what some of the opportunities are for people in that area.

Space heating in the United States takes about 20% of the total energy consumption that we use. And just to round the picture, we spend about 28% on industrial uses and another 25% or so on transportation, and the other 25% we use to make electricity. There is about 1% you use for various other things. My subject then is the roughly 25 or 26% of the energy that we use in the country for producing electricity. Most of this is used for industrial purposes as well as things associated with heating homes. There are also electric blowers associated with heating systems, but that is not the primary use of the energy. The primary use of the energy from electricity is the large industrial applications. As long as we have these large industrial users which require a large amount of electricity for their processing and their machinery, there is going to be some need for large central station plants. We are going to use large quantities of electricity to do that, but how much we need is somewhat off the question.

Nuclear Energy Production

What is the way we get energy out of nuclear processes? In the fission process, which is the process we use to generate nuclear energy at the present time, we take the neutron which is an uncharged particle which has the same mass as hydrogen and we let it strike an atom of Uranium 235. When that happens, roughly 3/4 of the time, this process takes place. Uranium 235 breaks into two pieces and it gives off 2 or 3, on the average of 2½, neutrons, depending on the process. One and one quarter grams of Uranium 235 will make a million watts of energy over one day.

There is another nuclear process off in the future that you hear talked about too, and that is the fusion process. Fusion process is the reverse. You take two isotopes and bring them together. You take an isotope of hydrogen and you put it together with another isotope of hydrogen called trillium, and if you can make this reaction go, you get a helium nucleus, a neutron and you get energy. You only get about 10% of the energy that you release in the fission reaction. About 20% of this energy appears as kinetic energy of the helium and about 80% appears as the kinetic energy of the neutron. So you still have neutrons associated with this reaction. Those are the two basic reactions that we use. We get energy out. We transform this energy into heat and the way you build a reactor, the way you design a reactor, is associated with getting this energy out and turning it into heat. We can do this in a variety of ways.

If we burn Uranium simply the way I spoke of earlier, the amount of energy that we have available is very small, not much bigger than oil. However, we can use the rest of that Uranium and we can use certain other materials

and kinds of reactions that are called breeding reactions. For example, if Uranium 238 goes through two nuclear processes it winds up as plutonium. An alternative reaction is thorium, plus a neutron, winds up with Uranium 233; and Uranium 233 and plutonium 239 are essentially equivalent to Uranium 235. The amount of energy that we have available with the breeder reactors is tremendous. Well, this is the incentive that led people 30 years ago to the development of nuclear power. There is a resource base there that is potentially tremendous, compared to any other non-renewable resource that we have. Furthermore, uranium has a rather unique property compared to coal or oil or petroleum or gas. And that is, when you think about what you can do with uranium, about the only thing you can do with it is extract energy from it. You can extract energy from it and make something like electricity or process heat. There are other things you can do with petroleum and coal. You can make liquid fuels, that you can use in transportation.

The reactor core is basically made up of pellets of uranium. The average rod in a reactor generates about 7½ or 8 kilowatts of power for every foot of length. Reactors have a relatively high power density. Radioactivity occurs in reactors, and we can't do anything about it. All we can do is minimize effects and keep it where we want it, inside of the reactor: design the pump with 3 seals, to prevent it from leaking; enclose the whole reactor. They are big and complex but they are made up of basically simple systems. The idea is to heat water hot enough to use it to make steam to make electricity.

There is some illusion associated with nuclear power plants. Two reasons -- nuclear power plants operate at lower temperatures than fossil fuel plants. Therefore they have intrinsically lower efficiency. Nuclear plants run around 31% efficiency. In a fossil fuel plant with 40% efficiency, 15% of the heat goes up the stack and the rest into cooling water. In a nuclear plant, all waste heat goes into cooling water. Any power plant regardless of whether it is a solar plant or anything else that puts heat out at 1000 degrees is going to reject just the same amount of wasted heat.

Nuclear power in the country is changing all the time. There are 56 plants operating, and these plants are producing 8% of the total U.S. energy capacity. There are 64 plants which have construction permits; another 97 plants are on order; and 17 in planning stages. Total plants will be 49% of our present energy capacity if they were on-line today. What do people in industry feel about nuclear power? Nobody in the nuclear power field feels that nuclear power is going to produce all of the electricity in the country or ever should. It is not suited, that is not its role, that is not the way it works best. It works best for providing the base load of electricity on a system. There are 3 kinds of generating uses that a utility has on its system. It has what you call base load. This means that you can count on generating that 24 hours a day. It has intermediate load, which means that it has to be on for a good fraction of the day to supply my demand. And it has a peak load, peak capacity, which means it has to be on for only an hour or two. It is the nuclear power that comes on as base load capacity. That is why it is economic, that is why it is cost effective. You can use it in big plants and you can run them for 24 hours a day.

Staffing Requirements in a Nuclear Plant

Standards are set up for related technical training associated with all the positions in a nuclear plant. There are approximately 113 people associated with the expected Koshkonong nuclear plant. About 80 of the 113 are technical people below the baccalaureate level. If you have 234 plants that are being built, only 9,600 people are associated with nuclear plants in the U.S. today. That is some idea of the manning requirements. It is not terribly great, but somebody is going to have to provide the technical training for these people.

Most of the technical training for reactor operations comes from the nuclear Navy. It can't expect that source to stay at that rate forever. Sometimes these technical people are going to have to be supplemented by people coming out of places like vocational-technical schools. We don't need college trained people for all of these positions. There are other areas for training within a nuclear plant. The nuclear plant by its very nature, and the fact that it has to be licensed by the government, requires considerable training in house. Sometimes this can be supplemented very nicely by outside organizations. Training starts 22 months before the plant is completed; and continues after completion with continuous formal retraining programs. Some of the retraining could be done by people outside of the organization itself. A service could be provided here.

Other parts of the nuclear industry provide jobs in manufacturing and operations associated with the nuclear power plant. Some of them require as many people as the plant itself. You start with the mining and milling operation and conversion. Conversion is the first technical aspect of the operation. This is a very large plant in which the Uranium 235 concentration is adjusted from its natural concentration up to about 3%. That is a place where there will be some increase in employment in the next few years. Teaching in lasers, operation of high speed centrifuges, health physics, quality control, quality assurance, etc. Fabrication, moderately high techology, in the power plant itself, in the processing plant which is another area I hope will become a remarkably expanding industry in the next few years. And finally a repository of some sort.

What is the status of the breeder reactor? Uncertain. Its technical status is quite assured, but its political status is something I can't comment on because its status is very doubtful at this time. There is a breeder reactor operating now in France. Operates extremely successful. The cost per kilowatt depends on when the plant is ordered.

If you went out and ordered a plant now you would pay in the neighborhood of $800-900 per kilowatt of capital cost installed. Capacity factor is roughly the same as the fossil fuel plants; it depends on the plant. The Point Beach plant operates very high. Operating cost -- utilities claim that the only reason they buy nuclear power is because they can sell it cheaper. They continually put out figures saying they save by using nuclear energy.

What about the spent fuel? Plutonium is toxic, we know, and it should be treated with respect. With respect to long term re-processing, people have been saying that the technologies aren't here for long term storage

of reactor fuels. I don't believe that, we just haven't got around to saying that we want to do it. It's going to be around for 24,000 years. When it becomes economically viable, spent nuclear fuel will be re-processed to a radioactivity level lower than the original ore.

What about safety? Environmental pressures working against the development of nuclear energy plants are enormous, but the actual danger of such plants is minimal. If the gasoline tanks of all of the cars in the Milwaukee area were to explode at the same time, the damage would be greater than that of a nuclear power plant's destructive potential. Furthermore, the likelihood would be about equal. No one has ever been killed in an accident involving a nuclear power plant, whereas a considerable number of coal miners have been killed in accidents or suffer from black lung disease.

FOSSIL FUELS ENERGY

Speaker: Professor Russell Dutcher, Chairman, Department of Geology, Southern Illinois University, Carbondale, Illinois

(Summary)

While I'm more than 50 miles from home and carrying a briefcase, I'm not sure that I qualify as an expert on things important to you: predicting employment in Fossil Fuels Energy.

The Crisis is Real

A few years ago some of us were referring to this as a dilemma or a problem, well, I now say it's a crisis. Personally I am horrified that some of our citizens were literally freezing to death because of a lack of fuel. I'm confused by federal and state policies, or lack thereof that contribute to this sort of happening. Ohio, where some people died for lack of natural gas, sits on a vast supply of coal. I am afraid that we will not have learned from this harsh winter, and next summer, as we push the air conditioner to keep cool, it will seem distant and unimportant. I am amazed because this is all so predictable. Natural gas companies knew it was going to happen and ran ads in 1969 and 1970 predicting shortages. I am scared by some of the attitudes which prevail in the country and Congress.

New England refused to allow a refinery for oil they need badly. California wanted coal to be burned in Utah to supply them power and has been resisting the landing of Alaskan oil they need.

There is a "plug in the wall" syndrome. There is no energy shortage as long as electricity comes out of the wall. Energy has been too cheap: open flame pots, decorative gas lamps, etc. I am worried about the lack of ability to face up to crises. There is overlap and confusion among federal agencies. Reactions to add restrictions, or another agency, won't solve this crises.

Rate of Expenditure

North America has 50% of the world's coal supply. U.S. coal reserves are in three regions, the Appalachians, central interior states of Illinois, Kansas and Missouri, and the Rocky Mountains. Seventy-two percent (72%) of U.S. coal is used to generate electricity by heating steam. Coal is supplying less and less of the total BTU's of energy as the U.S. mines more and more.

Every year we mine 40,000 pounds of new materials; 8,000 pounds of petroleum; 5,150 pounds of coal; 4,700 pounds of gas and 1/10 pound of uranium per capita in this country. The energy derived from this is the equivalent of 300 people working 24 hours per day to support each one of us.

We are using the energy supplies which are in shortest supply. Coal reserves represent 90%, but we are consuming it at an 18% rate. Petroleum and natural gas, in shortest supply, are being used the fastest, which appears disastrous. The U.S. is importing almost half of what it uses. A lot of projected energy supply is based on hoped for future oil discoveries. How did we become so vulnerable to imported oil? It's cheap, very readily available, easily transported, clean, and easy to handle. Will this change? The recent Arab oil embargo did result in reduced projections, but use is still projected upwards by significant amounts.

How will we meet these demands? There is an increase projected for oil and also for coal. What can we do as far as conservation is concerned? The Federal Energy Agency (FEA) feels that the price of unregulated fuel charges would cut back the use growth rate from 3.6% to 2.8%, and if we do everything possible in the area of conservation, which can't really happen, we can cut that rate to 2.2%.

New Petroleum Reserves

There are two major areas, geographically, which we can turn to for fossil fuel energy. The first is the outer continental shelf where we can drill for oil. The second is the public lands, primarily in the West, for the production of coal. The problems associated with oil shale are absolutely fantastic, not the least of which is you end up with more material volumetrically than you started with, and there is no water for processing it.

We are currently producing about 7 million barrels a day of crude oil from presently booked reserves in the original 48 states. By 1985, FEA predicts production will have shrunk to about 2 million barrels a day. Four and a half million barrels a day must be found just to hold production levels where they are now. That alone is like having to find, develop and get on-line a new Purdoc Bay field every three, and Purdoc Bay at 10 million barrels is an extraordinary find. We shall have to add about 60 billion barrels of oil to our proved reserves between now and 1985 to meet a new higher goal of 14 million barrels a day.

If we convert coal to synthetics, we can remove the sulfur but it is only 50% efficient in the conversion itself, which is wasteful of a natural resource. One neat way to do it would be underground gassification because you could use very thin seams. But every time a study is conducted, the fire keeps going out. Historically, water power has supplied only a low percent of energy used, 2 to 4%. Water power is limited to sites provided by nature, and we have used up the decent sites.

WIND ENERGY

Speaker: Benjamin Wolff, Director of Research, Windworks, Inc., Mukwonago, Wisconsin

(Summary)

The range of sophistication of windmills is incredible. Simplest machines are those made for applications in developing countries such as the Calonius rotor made from 55 gallon oil drums. They are split and rotated around on a vertical shaft. They are inexpensive and really work. They are used primarily for mechanical power applications where material resources are limited.

Another variation is the sail windmill. This is inherently more efficient so you can get more power. Someone must adjust sails to match the available wind and the load.

You can build a home-built machine for about $200, if you put in the labor, but only a select group of mechanics is successful.

Dutch Windmills

The Dutch windmills are very finely crafted pieces of machinery. These machines evolved over hundreds of years to the demand for power under natural environmental conditions. In the early 1800's they started to mechanize them. One example is spring shutters rather than the miller wrapping cloth sails over the latticework to catch the wind. A wheel was used to orient the windmill into the wind. People would have to wait for their grain until the wind was right.

There is a big jump in sophistication to the American farm windmill because of their mass produced manufactured parts. In 1850 these machines produced an estimated billion kilowatt hours of energy, or 25% of America's non-transportation energy requirements. Farm windmills have fallen into disuse, although widely used in the West for pumping water. The largest diameter going is about 16 feet in diameter.

Prior to the advent of centralized electrical power distribution, around 1930, windmills were in widespread use and this gave rise to maybe 30 manufacturing companies throughout the U.S. The state of art of energy storage still is based on storage batteries, which tend to be expensive. The control circuitry consisted basically of a reverse current relay that cut the power lines from the battery back to the generator. The generator must be supported but the blades are mounted directly on the generator.

Commercial Systems

The largest commercial system currently available has a 30 foot diameter and only a 4 kilowatt generator. The cost of the machine is about $25,000. Amortized over 15 years, using Wisconsin winds, that power will cost you roughly 10¢ a kilowatt hour. The current cost of several wind systems averages around $1,000 for each kilowatt capacity.

Potential Contribution of Wind Energy

Wind has a potential 10% contribution to the nation's energy supply, according to a NASA/NSF panel. Windworks has developed a synchronous inverter which takes variable voltage DC power and synchronizes it with the AC line. What that means is the battery storage bank is replaced because the excess generated flows back to the utility company, and when your windmill isn't providing enough, the difference is provided by the utility company. This reduces costs from roughly 20¢ to 10¢ per kilowatt hour. In New York city, electricity is already up to 9¢ per kilowatt hour.

To meet our needs we will need a blend of energy sources. The biggest impact of these home size energy sources is a sensitivity to where our energy comes from. In three to five years you will be able to justify putting a windmill in your backyard because you will get cheaper electricity than from the utility company.

ENERGY PROBLEMS AND VIABLE SOLUTIONS

Speaker: Robert Bauer, Manager, Chicago Office, U.S. Energy Research and Development Administration, Chicago

(Summary)

Just a few weeks ago whenever I went out to speak about the energy problem, people generally weren't aware that there was one. The last six weeks have demonstrated very painfully to a large segment of the United States population that we are in trouble. The solutions to all these problems will not be technical. There is a myriad of problems that we face; economic, institutional, societal and technological. The key thing demonstrated is that we have to proceed on a variety of fronts, both technological and non-technological areas. Technologically, we have to come up with a number of alternatives which result in development of effective, safe, economical, and diverse technologies for the future.

Diversity of Energy Sources is Needed

Illustrating that is an article which appeared recently, dealing with an electric power emergency in the eastern part of the country caused by a record winter demand of 56,200 MW. Frozen coal piles incapacitated 9,000 MW. Oil and coal barges were paralyzed in the Ohio River ice. The east central states were 90% dependent on coal, much of which was locked under mountains of ice. Dayton Ohio Power and Light, for example, was operating at 50% capacity. The areas bailing out this coal fired area were largely nuclear powered. In the New England pool, all seven of the nuclear plants were operating and providing 30% of the output. Chicago's Commonwealth Edison which is normally 40% nuclear had coal freezing problems and with 5% voltage reduction increased nuclear output to 48%.

The only nuclear power plant reported incapacitated by the cold weather was the Virginia Electric Power Company's installation which failed because ice in the James River clogged its water intake. Diversity in this instance prevented a common mode failure, and saved the day. We cannot have a single source dependence if we are to survive crises like this winter.

Shift Needed in Energy Sources

Twice before this nation has shifted to new primary forms of energy, from wood to coal in the 19th century, and from coal to oil and gas in this century. Each time it took 60 years to reach maximum use. We cannot afford to take another 60 years to accomplish the changeover we need now.

On June 30, 1975, the Energy Research and Development Administration presented a plan to expedite this changeover. ERDA's mission encompasses 6 major programs: fossil energy, nuclear energy, solar energy systems, environment and safety, conservation of energy supplies, and national security. In the short term, today's energy producers must be expanded to buy time for the development of new energy alternatives.

One of ERDA's main impacts during the next few years will be the expanded use of coal, the country's most abundant fossil fuel. Thirty years ago it supplied 75% of America's energy needs. Today that figure has slipped to 20%. Fluidized bed combustion systems burn coal in suspension with limestone which chemically removes the sulfur, up to 90% in some small scale tests, which will allow coal to stage a comeback.

Energy Conservation to Reduce Waste

Energy conservation is most likely in the short term to give the biggest payoff in terms of tangible results. Because of our past history of cheap, unlimited energy we as a nation have become wasteful in the ways we use it. One third of our total energy budget is being used to operate heating and air conditioning indoors. One of ERDA's objectives is to reduce energy use in existing buildings by 20%, and by 30% in new structures.

Industry consumes 42% of the energy used in the United States. Almost half is rejected as waste heat. Transportation consumes over half the petroleum used in this nation. ERDA's transportation program hopes to develop more efficient autos, buses and trucks which are now totally dependent on petroleum. New concepts in combustion engines, such as a gas turbine car under development, might lead to use of fuels other than gasoline. Cars may someday be powered by new, smaller batteries.

Energy from city and farm wastes is a possibility. The BTU content of corn residue alone is greater than the BTU consumption in the machinery used to grow all Midwestern crops combined. ERDA is also working on coal liquification and on underground coal gassification.

Another potential contributor to this nation's energy future is oil shale. However, just handling the shale is an enormous problem. To produce one billion barrels of oil from shale would require mining and processing 1.4 billion tons of rock and disposing of five sixths of it. The volume of residue presents an enormous environmental problem.

Today, the only geothermal source in the United States generating electricity commercially is the geyser steam field north of San Francisco. Dry steam fields such as this are rare. Water and highly corrosive salts mixed in make it difficult to extract energy. The real geothermal bonanza might be subterranean, dry, hot rock.

Another technology is use of solar energy for heating and cooling homes and buildings. A number of systems are currently being evaluated by ERDA. ERDA's national plan includes wind energy generators.

Long Term Energy Sources

For the long term, at least one of three "inexhaustible" energy sources will be used: breeder reactors, nuclear fusion, and solar electricity.

PANEL: IMPLICATIONS FOR ENERGY USERS

IMPLICATIONS FOR AGRICULTURE

Speaker: Russell Weisensel, Executive Director, Wisconsin Agri-Business Council, Madison

I found Mr. Bauer's remarks on ERDA most intersting. I was not familiar with this organization, with this government agency. I have to admit that I was both awed and very pleased with some of the research that's going on and with most of which I would agree. I've seen a great deal of government action with which I did not agree that had something to do with energy mostly because it was based, probably not on research such as this is, but on emotion and on what was politically viable at the particular time. I did get kind of a kick out of that eggbeater rotor, that vertical rotor turbine, because I heard of one fella that was working with one of those. He designed it doing a very efficient job because the gearbox and everything is down on the lower end. But since he was hiring some help OSHA came and investigated it and by the time he got the shielding up, no wind could get through to make the darn thing run!

Efficient Use of Energy

I look at that same thing with my automobile because I drive a big car with a 383 Chrysler engine. By the time we got through with the pollution controls on it, for three different cars, mileage went from 18 miles per gallon down to a little bit below 11 miles per gallon. It's less than 60% as efficient as it was when I started driving that car, and that has to do something with the total energy supplies in this nation; you kind of wonder if the government isn't somewhat self-defeating.

Agriculture is extremely dependent on energy. The total agriculture food production complex uses approximately 15% of the nation's energy. Only about 3% to 4% of this is used directly on the farm. Most is in transportation and in food processing. But it's very, very important, and some of this does not, or cannot, be replaced with other forms of energy regardless of what some people would like to have you believe. We have gotten tremendously efficient in energy, so that now one man on the farm produces food enough for about 56 other people, but this man on the farm is supplemented with some people from Allis-Chalmers and some people from the power companies, and some people from the oil industries, and some people from the chemical industries to make our equipment able to produce this kind of agriculture, this kind of food product.

Energy Intensive Farming

We've gotten efficient. In World War II it took about 68 minutes of labor to produce a bushel of corn; today it takes about 4 minutes. If you go back into the early thirties, you will see that in the United States, we had over a hundred million acres of corn. That dropped down to a little bit below 70 million a few years ago and now it has gone up to 80 million acres of corn. On less acres we have more than tripled or quadrupled the amount of corn that we produce. Better tilling habits, better seeds, better

herbicides, better weed control, chemical fertilizers, all of which are energy-intensive, have meant that we could release land for other things. It might be highways, it might be power plants, it might be a golf course, it might be land that should not have been in corn or row crops that we can have now for recreation, because we can use energy.

If I can quote a study by Barron back in 1970: he took the 17 most important food and fiber crops in the United States. He took the yields back in 1940 on these basic crops; then he took the total yields in 1970, and he found that in order to get the 1970 yields using the 1940 yields per acre, you would have to till an additional 241 million acres of land in the United States. That's equal to an overlay on a U.S. map of most of the land south of the Ohio and east of the Mississippi River. So with better methods, with the support of agribusiness, with intensive use of energy, we've gotten a pretty efficient form of agriculture.

You saw in Mr. Bauer's remarks that the Midwest is very diversified in its energy sources and resources; and I think this is very important. As a livestock man, I was just telling John here a little while ago that I have a girl who's a sophomore in high school and a boy who's a senior, and right now they're handling a few over 300 head of cattle on our farm. We've got a bunch of them just coming up ready to market; we've got another bunch of about 165 600-pounders that we just started in the last couple of months. I can go back just a couple of decades ago when on our farm we had up to a hundred head of cattle and there were three full-time men plus-- I was a boy at that time who thought he was working awfully darn hard-- taking care of a hundred head of cattle. And now I've got two high school kids who are taking care of three times as much, because we've got electrical energy that we can use. It's extremely important.

I shudder when I see the people who are so fearful of nuclear energy. Yes, there is some risk. No doubt about it.

Necessary Risks

I've got a quote that I came across a couple of weeks ago that I intend to use, and use regularly, and it's in an article related to nuclear energy, and then a famous United States scientist was quoted. This was printed in the Scientific American. It says that this energy is unnecessary and dangerous. It goes on, "I can therefore see no justification for the introduction of a system which has every element of danger to life and property." That article was written in 1889, 88 years ago, by Thomas Alva Edison, and he was talking about alternating current. And you know he was right: because there are a few over 1,000 people electrocuted every year in the U.S. with household current. So he was right: and there is some danger and there is some risk. But I think in all the studies that I've seen, we're going to have to make better use of coal, we're going to have to use nuclear energy if we wish to make any use of our other resources for the immediate future. I'm somewhat optimistic about this, this American inventiveness in the things that we'll need.

I also think, and I made the quote to the governor this afternoon, that somewhere we're going to have to see energy prices raised somewhat because there is no incentive to conserve, there is no incentive for alternate fuel supplies if fossil energy is still so cheap. In agriculture, human energy,

at $3.00 per hour, costs about 400 times as much as fossil energy. We aren't going to substitute hand labor for diesel fuel with that kind of ratio. It isn't going to change. It's also, in a world full of food shortages, difficult to argue that society should save one calorie of fuel and cause about a six-calorie reduction in food supply.

No Going Back

We hear people sometimes say that maybe we could go the route of going back to horses, which are energy-efficient: they use no fossil energy. It would take about anywhere from 61 to 80 million horses if we eliminated the tractors. There are 3 million in the country now, most of which are not work horses--the only work horses I know are those that pull the Budweiser wagon. It would be impossible to increase to that number of horses in the U.S. until about the year 2000. We'd also need another 31 million farmworkers; we now have about 4 million. And we'd have to go back to 1920 living standards--everybody. And I don't think we're about ready to do that. I also would like to project the figures it would take in the land to feed these horses. It would take one awful lot.

I was very interested this afternoon. I want to react a little bit to the gentleman, who is a geologist, talking about coal because some of the new reclamation areas for coal, with seeding and the establishment of pastures means that livestock can be raised at this area and you can convert that back into topsoil. It'll take a few years. But you can take this bovine animal and convert what are non-food resources into a good, viable, complete protein.

In the U.S. we use our livestock industry: we have about 8% of the ruminant animals that are in the world; but this 8% develops about 60% of the food. We use our agricultural resources: yes, we use energy, but we're also able to export food, we're able to put food into foreign mouths for the developing nations, we provide about 50% of the food that goes into world trade, the agricultural exports equal about, dollar-wise, the amount of oil we import. So we have to keep this agricultural economy going.

ERDA Activities

I was very pleased with Mr. Bauer's remarks, and what ERDA is doing. I would hope that he can work a little bit with EPA. I would hope he can also work with OSHA. I would also hope that he can work with some of the consumer activists. I think the consumer is looking for answers and help, and some of the activist groups, I think, are looking for issues. I was very pleased with what ERDA is doing and hope that we can continue to keep this thing moving.

IMPLICATIONS FOR LABOR

Speaker: John Schmitt, President, Wisconsin State AFL-CIO, Milwaukee

Let me say that the AFL-CIO, of course, up to the present time, and I don't see any change in the immediate future, feels that nuclear power is the answer to America's energy needs. An ample supply of energy, of course, is needed for production. Production results in jobs, and I don't know where we would be in this country without jobs. This is our prime concern.

Leadership of Energy Legislation

It was interesting enough, though, a week ago I met with the four leaders of the State Senate here in Wisconsin to talk about certain legislation. One of them made an observation that the AFL-CIO is pretty well getting aligned with business. That's an interesting observation from where I sit because all the years I've been in the trade labor movement it seems that the labor movement has been the real opponent and bogeyman for business interests. So to have a what I consider liberal senator feel that we are now aligned with business is a new twist. Time will tell how true it is. But we realize, of course, that unless energy needs are met by the industrialists of this state, as well as all over the country, our ability to have gainful employment is going to be really threatened.

I think the vocational system ought to be commended for their concern having this type of conference. I think for too long a small vocal minority of educators led the charge in all the legislative halls to do the things that they don't really know anything about. I don't mind someone who's worked with his hands in his lifetime telling me about the dangers of the workplace. It sort of galls me to have someone out of the university, who's never been inside a plant, tell me how dangerous it is. So I think those of you in the vocational system who understand the world of work--and I imagine your mission in the vocational schools is to deal with the world of work and not higher education, although I'm not so sure all the directors follow that philosophy, realize that your vocational system, our vocational system in this state, is dependent on industry providing us with a job. Then it becomes your duty to provide the workers with the skills to man those jobs. So your facet is very, very important, but there is no need for the system unless there is an industry that requires the skills of skilled workers. And so I think that your voices ought to be heard in these important areas where you have some expertise to offer.

With all due respect to government, I think a great number of our problems are a result of government inaction, or over-inaction, by agencies. Not so much sometimes by the legislators as regulatory powers that have been assumed by many of the agencies, including those on a state level. You know it's fine for elected officials to talk about conservation. Great. But how far can you conserve? I mean there's only going to be a small amount that you're going to conserve in the long run.

You know, workers happen to be consumers, so we're concerned about where the consumer ends up in this picture. Now if you want to save gasoline, I imagine you could arrange to charge $1.00 a gallon for gas. What does that do to the consumer, though? He'll use less, but he may not be able to get to work either. In the long run if you're going to raise the prices of all these things, you can be sure the worker will be back at the bargaining table to take care of all those increased costs that somebody is going to ask him to absorb. And so it's just a complete revolving circle. I think it's high time that politicians quit talking about what they want to do, and do it.

Now, you know, for a number of years in this state all we had were coal-burning power plants. Then the objections of those who know came to the forefront. In many instances they were right, so we changed to nuclear power. That met a lot of objections. Our latest plant, if it gets off the ground after the umpteenth agency and bureaucrat finally gets around to deciding whether the grass is going to go on the east side or the west side of that power plant, we may finally get it going in Kenosha County. And that's going to be a coal-burning power plant. It's going to use western coal, which they tell me is treated so that the fly ash content will be--you just can't see it. This also is going to require the government to start moving, because we're going to find it difficult to bring western coal to Wisconsin. Why? The railroad beds throughout this country are shot. The railroad industry has done little or nothing to maintain the kind of railroad beds we're going to need, if our railroad unions correctly tell me what's going on, to keep them bringing the kind of supply of western coal to the eastern end of this country to provide the energy we need. On top of that, we don't have sufficient cars. We are going to have to start building gondolas day and night in order to take care of that need.

Energy From Garbage

Milwaukee County, I don't think, is any different than any other county in this state. We are starting to lose our land filling sites; we're running out of them. So what do we do with our garbage? Lake Michigan has problems; Wisconsin, Milwaukee especially, has sewage problems, so we go ahead and we support the construction of a recycling plant in the Menomonie Valley. A $17 million plant built by private capital. The labor movement supports that recycling for a number of reasons. However, again we finally meet all the objections and the plant will be able to operate by June of this year. Now that plant is going to use a lot of the garbage that's been going into land fill sites.

Above all, the engineers of that plant say they need a certain mixture of garbage to produce the kind of a burnt-off substance that can be sold to an electric company, which will burn it off and sell energy. That requires x number of thousands and thousands of tons of bottles and cans. It's all part of the mixture that goes into it which will make that company profitable to justify the $17 million expenditure. Here's a recycling operation, and we think we ought to have more of them in this state and throughout the country, which will take care of the garbage, the waste, that right now is being put to little use in many areas and is going to be more of a problem as time goes on.

Needed Growth in Energy

Our research people in the AFL-CIO estimate that if we are going to project the kind of annual growth that we need in this country, we're going to have to have a growth in energy of 3% every year from now on if we're going to have the full employment that the politicians talk about and promise. So our needs are not going to be less, they're going to be greater.

We're well aware of the danger that this country faces. Now the United States was a world power; we were dependent on no one. I don't know what price you can put on freedom. I think for a while more Americans were aware of the dangerous position we were in during the oil boycott, when we were taken care of by the cartel. It's dangerous for this country to have to rely on foreign countries for their existence. Our people estimate that we could remove the present 6 billion barrels a day that we're getting now from the Middle East if we built sufficient nuclear power plants in this country in the next 12 to 15 years. That's part of our whole freedom, our whole ability in not being dependent on any foreign powers. And at the same time, of course, we'll create the kind of economy that's going to do the things that many politicians now promise to us as coming tomorrow. Only tomorrow is never here.

So these are threats we see from the standpoint of the ability of the American economy to absorb the workers today into the work force. You know, I think there's something wrong in this kind of a country when we see a state of Ohio that has better than a million and a half workers out of work, not because of lack of orders, a lack of energy. This ought to tell us all something. I don't think we want to continue to get ourselves into that kind of a position. And you've got to do it now. I think we have all the studies we need. The opposition is always going to be there; we refer to them as "no-growth" people. I'm sure most of them are sincere, but I don't think they can recognize the kind of a danger, as a result of some of these things, that we put ourselves into. And we can't continue to live in an economy that's going to be short of energy from now on in.

Changing Energy Sources

As our plants in this country change, they become more dependent on energy. There was a time in our plants when you needed a strong back. Today you need a good index finger and two eyes. This is what's happened with technology. In the last eight years in the Milwaukee area of our construction industry, practically every home built had gas--no oil or electric heat. I wonder what's going to happen this year. We're going to have to change in our home construction, either to oil, I suppose, or electricity. But eventually if we can't supply the proper amount of electricity from the power plants, what happens to those homes that are built with electricity as the main source of energy? And I hate to see a home being built with oil if we're going to be more and more dependent on the oil cartel.

So I think the job has to be done, and I think the people who understand the needs are going to have to be as vocal as those who may have some legitimate concerns. But I think we can meet these concerns if they'll quit obstructing. But, you know, they say, after one study, that we need another study because somebody filed a new objection. I don't know where the objections end. In the long run, it is the consumer who pays. I have never seen any employer that spent a dollar that he didn't get back some way or the other. So these delays and the costs only end up in one person, the person who's going to buy the product, or the person who's going to have to pay for that energy.

Safety of the Workplace

So this is the concern of the labor movement. We know all about the dangers of the workplace. We know, we go there every day. Matter of fact, we should eliminate the kitchen because that's where the most injuries are. Maybe we ought to suggest that everybody eat in the restaurant from now on; I'm sure the women would be happy. We know the dangers of the workplace. Every day our workers go to a place that they could be hurt.

As far as our plans are concerned, at the present time we have in the neighborhood of 8800 members of one union that operate the power plants in this country. We organized one, the IBEW, International Brotherhood of Electrical Workers. We have not had one fatal accident yet to any member of our union in all these nuclear power plants. It could happen tomorrow, but you could be killed tomorrow walking across the street just as well. We think nuclear power is safe. We know that precautions have to be taken, but until we can find another way that meets the energy needs we're going to keep supporting the construction of nuclear power plants.

And it can't be done overnight. It takes ten years in this state to construct a nuclear power plant, takes about seven-eight years to construct a power plant that uses coal. They're not done overnight. And the longer we delay and put off the construction of power plants to supply us with the energy needs, the greater the price we're going to pay, not only as far as the employment picture is concerned, but I think the continued dependence we have in this country on foreign powers.

IMPLICATIONS FOR INDUSTRY

Speaker: Warren St. John, Engineer Consultant of Manufacturing Services, Allis-Chalmers, Milwaukee

One point that John made when he was talking about how many years it took to develop a powerhouse, to build it and get it generating power, he forgot to add about the seven years of environmental impact statements that have to be gone through before you can even start on the damn thing. I think that industry is looking at it from this standpoint of today: that we're becoming the victim of the over-zealous environmentalists, people that are so afraid that we're going to destroy this country by putting in a nuclear power station that we're going to destroy a certain section of the nation by doing so.

Development of Nuclear Energy

We heard a talk given one time by a friend that was from the Chicago area, not an environmentalist, but he was from the nuclear section down there in Chicago; and he was comparing a city the size of Milwaukee and he was assuming that all the cars that were driven around the streets of Milwaukee were driving around with a full tank of gasoline. He was adding up the number of BTU's or explosive forces that would be available in all those cars driving

around the city of Milwaukee, and if something happened that instantaneously all of these cars exploded because of explosions occurring in the gas tanks in all the cars, then it would destroy the city of Milwaukee. But the area that would be destroyed would be greater than it would be if a nuclear power station went up; and the odds of that happening are just about the equivalent. If you can imagine 50,000 automobiles, simultaneously the gas tanks exploding; that's about what the chances of a nuclear station are of having a major catastrophe.

Industry supports the future development of both nuclear and fossil fuel from the standpoint of coal-burning. We think it's a sin to burn oil or natural gas for any purpose, really. We're looking at industry from our standpoint that electrical energy is going to be our main source of energy in the future. We know that that's always going to be with us in one form or another. I don't think we're going to be generating electricity in the year 2000 by a rotating generator. We're talking about a process of generation of power that's only about 40% efficient at maximum. I just can't see how we can afford to continue with that kind of inefficiency, and I don't think we will. I think our technology can change. Nevertheless, we are expecting to be totally dependent upon electrical energy in industry in the future.

Energy Costs

Most of our plants that we're building in Southern areas are electrical plants. We don't have any gas in them. And we're finding our total operating costs, in conducting our energy audits that we do throughout all of the country, that our total energy costs in the total electrical plant for direct labor hours is not as great as it is up here in the Northern country where we have to operate big powerhouses to keep the place heated. We have air conditioning costs in the Southern plants. Electrical energy can be utilized more efficiently than burning of fossil fuel to generate steam and then distributing the steam throughout a plant with all the inefficiencies of heat transfer and whatnot. We're finding that we can apply electrical energy much more efficiently and probably get more out of it.

We found in Kansas City and Independence that our gas costs, for that particular plant in 1975, ran about 6¢ a therm. Our electrical energy cost for that plant was 56¢ a therm. How can you ever expect anybody to save and direct their efforts away from natural gas at those prices. I think we all realize in industry that natural gas is unrealistically price-controlled. Unless we do something about it and get the price controls off and let the free marketplace take over, I don't think there's a question but what we're faced with more energy problems in the future. This temporary relief, of price controls, has just been imposed by the President. It isn't going to do one bit of good toward solving our energy problem. And I'm speaking from industry; we don't want to pay more for our fuel. We don't want to see you pay more for your fuel at home. But you've got to realize the fact that we're going to be faced with higher costs of energy, considerably higher, and we're going to have to live with it, and learn how to live with it. For a direct labor hour there is about 25¢ in energy costs for most of our plants' operations.

Conservation Buys Time

One of the things that concerns me and, I think, should concern all of us, everybody's saying, conservation--that's the answer to everything. Conservation does nothing but buy us some time, and we've got to buy the time. I listened to the president of our electrical power company in Milwaukee. He says they cannot justify building more plants or expanding their existing electrical plants. Well, I talked to him; what are you going to do when we replace existing boilers and put in electrical boilers, because we can't get gas any more; where are you going to give us our electricity from if you're not going to expand your plants?

Our environmentalists have stopped the plant at Pleasant Prairie. We've got to have that electrical energy, and we've got to have it by 1980 or we're in serious trouble in this state. Conservation is only buying us time, and it's not going to be the total answer. The electric company is forced by legislation not to advertise the benefits of the heat pumps. Your homes of tomorrow are going to be heated with solar and heat pump combinations. We shouldn't be allowing people to burn gas in their homes any more, because when that gas is gone you're not going to have anything to heat your homes with.

I agree that the single-source dependency is a noble statement. And I have to agree that we have to look at it that way. This afternoon we listened to solar energy, we listened to nuclear, fossil fuels, and wind. Solar energy and wind energy, as far as industry is concerned will never be an appreciable percentage of our total energy demands and needs in my lifetime and, I'm sure, in the next generation's lifetime. It may be something else by that time, but I can't see solar energy for industrial needs, of generating electrical power that we need to operate our plants, to keep our motors running, as ever being much more than an assist, a plus. You look at the total energy developed by hydro power today, and you can't figure out why, with all these big dams we've got around the country, we're not generating more than 4% hydro. But that is the case, and I can't see that solar energy and wind energy are going to get us over that hurdle, either.

Impact of Energy Policies

There are a couple of things that, in speaking of Governor Lucey's address this afternoon, I sort of take exception to. One of them is that this state is in good shape because this state was prepared. The hell it was. This state hasn't had an energy policy.

The federal government doesn't have an energy policy. We had a report for our company of our energy progress that we've made in a certain number of our plants that used over a trillion BTU's of energy on a base year of 1972. Our report, by the Federal Register, had to be filed with the federal government January 1, 1977. December 15, I called Washington to find out where the report form was that I was going to report on. It wasn't ready yet; they hadn't approved the form. So I said, "Well, how am I going to report by January 1 if we don't have a form to report on yet, or I don't know what to report on? I don't even know the base year for sure, except from what I heard. I don't know what you're going to use as a comparison." Well, he finally gave me that information: we were to report the first

six months consumption of energy in 1976 vs. the base year of 1972. The goal for this particular group of plants that I was reporting for was 15% energy saving on the basis of some kind of measure of activity in our plant. It had to be direct labor hours, and we picked the most logical one to use. So anyway, without the form we made out the report and sent it in. I still haven't seen the FEA forms we were supposed to use; our reports came out, purely by luck, that our direct labor energy ratios had improved by over 20%; the goal was 15% established by the government.

And it's totally a fictitious improvement, as far as I'm concerned, because this improvement was shown over base years in which our plant had not done really very much about energy conservation. It just happened to come out right. I don't know what I'd do if it didn't, but it's one of the fortunate things. We have another thing in this state, interruptable gas rates for our company which states in the contract that if the gas company restores your interruptable gas after they've cut you off, you have to go back to burning that natural gas; you can't continue on using your secondary fuel. It's written right into the contract. That's conservation of the natural gas?

Allocation Systems

We've got another problem in this state: allocation systems. Our company happens to be one of the 21 that every time they run out of natural gas for other people, they shut us off. So we have the interruptable rates. So we conserve. We have another gas supply that's high priority gas, as we call it: it's not interruptable--although we found out this winter that there is no such thing any more. So we conserve the high priority gas. Then, at the end of the heating season the gas company finds out that they've got gas over in the reservoir in Michigan. How would you like to burn this in your boilers now? We've got this gas and we need to get rid of it. So they sell it back to us to burn in our boilers, so they can use up all of their allocation for that year, so they can maintain a higher allocation for next year. We had a 25% savings in high priority gas, then we turn around and burn it in a boiler as a low priority fuel just to use up the allocation. Now is that conservation? We've got a few problems yet in this state as far as industry is concerned.

Another thing that happened recently in a gas increase that came forth in this state throughout most of the plants in Milwaukee: 27% increase in natural gas costs to industry, -1%, or a saving, to the consumer. We're all consumers, and we're not complaining from the standpoint of the raises in the natural gas prices. We all know it could be higher priced. Fuel should be priced on the availability, not on the cost necessarily, although we'd like to see it that way. But natural gas is too precious a commodity to sell at the reduced prices the way they're selling it today. If they pay more for it, they'll save it better. And I've seen a lot of our industries that don't take the precautions of saving that fuel simply because it doesn't cost them that much.

We have a plant down in Texas. Just before Christmas they shut them down for two days; they're cutting back their gas supply to 10% of their minimum supply. Well, that 6¢-a-therm gas didn't do them much good when they couldn't get it to come through the meter at all. They had to shut the plant. But they had not put in a standby supply of fuel, or secondary

supply, simply because they couldn't justify the dollar expenditure for it. The gas company says, "We'll always have the gas for you. You don't have to worry." We don't believe them. And I don't think any of you people that are involved out there in industry should, either. You have got to establish secondary fuels; not standby anymore. You've got to establish secondary fuels and use all of them and maintain that supply line in order to keep the plant going.

IMPLICATIONS FOR CONSUMERS

Speaker: M. Janice Hogan, Associate Professor, Department of Family/Social Science, University of Minnesota, Minneapolis, Minnesota

I'd just like to speak to the comments that both Governor Lucey and Robert Bauer made in terms of conservation. Most of our time seemed to be used to explore the kind of new supplies that we can look forward to. Well, we've already talked about conservation, and I'm not really certain that we're very serious about it. I would imagine most people in the room have "dialed down" in terms of a degree or two and they probably have made some other kinds of changes in behavior this year. I don't know what will happen next fourth of July when, perhaps, the crisis kind of environment is over.

Family Living Style

I'd like to make several comments in looking at the family as a critical decision-making unit. I think that probably government policy has not looked at the family seriously as anyone that's going to do anthing that's going to make much difference. So I think that is probably why they continue to turn to new sources of supply. Though that is terribly important, it underlies the whole consumption pattern, the family is an energy-driven system. I don't know if we're really as conscious of that.

I have a couple of case studies here; let me at least describe a litany of energy. This is a family, middle-income; a middle-energy family in terms of consumption. They have a house with five rooms, excluding a bathroom; they have a central furnace with natural gas. The house is owned and paid for; they have lived in it since they were married. They have two cars. The next car they get, they would like to have one with more economic performance, less luxuries, less styling, so they say. They feel that they have decreased their trips for recreation and leisure; they have tried to conserve. They have turned down their thermostat. They wear heavier clothing. They have closed off a room of their house. And on and on as we go. They have a self-defrosting refrigerator, freezer, clothes dryer, two TV's, one of which is color, three electric clocks, toaster, electric frypan, power tools, and on down. Snowmobile, motorbike, camper; I could go on and give you some more on that one. That's what I will call a rather modest energy appetite.

Now let me give you just another one, and we had in our study over 200 families, so I really have not pulled them out to give you any kind of shock treatment. I think if you were to run down your own litany, you

might find it not terribly different from the cases that I'm using. This is a family: the husband's an engineer, both husband and wife are college gr[illegible]tes, with three children; they live in a single-family brick home with a central furnace heated with natural gas, ten rooms, including three baths and three bedrooms. They're planning to move to Florida when they retire, into a small home.

They believe that the energy problem is real; they've talked about it, they've read about it, they've taken political action. The husband supports a policy to give tax deduction for home improvement, and she would support closing the schools in the winter. I might say that their children are no longer in school. People tend to support those kinds of policies that have no effect on their own behavior but imply that it's their neighbors who are the ones who really need to conserve and change their behavior. They have a couple of cars; they have two self-defrosting refrigerators, two electric ranges, three TV's, six electric clocks, dishwasher, three-room air conditioners, toaster, electric can opener, vacuum cleaner, three coffee pots, five radios, six power tools, electric garage door opener, waste disposal, and I won't go on with the rest of the list.

Conserving Energy

To say that the family is an energy-powered system is nothing that is new to you at all. About 37% of the total U.S. energy budget is consumed by individuals in households or families. If you were to take a look at how families might make a difference in terms of conserving, there would be two things that they really could probably do. Of the energy that families use, about 42% of it is driving that car, or cars, around, and so, if they were to make any difference, it would have to do with changing their behavior in driving. The second one is that 40% of the energy in the household is used for space heating and cooling; and, of course, that would make the other kind of great difference. So now we've accounted for about 82% of the energy that families use. You can talk about turning off the lights, and I suppose if you turned them all off, you would save 1% of total household energy. You can talk about cooking and using your refrigerator, and you're talking about 4% in each of these cases. So basically, if families want to conserve, there are two really major areas in terms of direct energy: one of them would have to do with changing or improving the kind of energy efficiency that the house might have, the other the car and where that car might go.

I'm just going to give you some decisions on energy use that I think that families could make that would make somewhat of a difference, besides the kind of thing that I talked about: dialing down the thermostat, insulation and the other kinds of things on that. How clean is clean? We've really done a job in the United States on using hot water. That's not the major source of where the energy goes, but it's linked to a lot of them; and it has to do with the clothes you've got on, which I would imagine for most of you are petrochemical. If you were to change, then the textile industry would change tremendously, and so too the decision and choices that families make about the clothing. Now we're into indirect energy use. You'll find that 65% of the textiles that are used by families in their decision-making

are petrochemical-based. If you take a look at the 35% that have natural fibers, you would find that they are terribly energy-intensive because of the kind of finishes that are on them. Families, no matter where you turn, make energy decisions. The length of time that people take showering, how clean or how dirty a towel is, or whether you wear a shirt more than once--all those decisions are energy-based decisions.

Energy Use Decisions

If you even took a look at the kind of gifts that people give, it's hard to find things for the poor Americans who have everything, and so you give them something with a motor on it: an electric comb, an electric brush, and electric shoeshine, an electric whatever-it-might-be. Our energy-intensiveness permeates all of our holidays. I am not for cutting all those things out. I am for raising the conscious level of families on their energy-intensive decisions and having them perhaps re-look at the kind of energy and how they want the fossil fuels that we have spent.

In a recent article about quality of life in comparing with some other countries--Sweden was mentioned earlier today--and as you started reading that article and you take a look at how many doctors per thousand, how many teachers per thousand, how many a-lot-of-other-things, how many books per thousand. Anyway, you take a look at a lot of indicators of what one might consider quality of life, and really we compare almost equal; and the only place that you start finding the difference why they use 60% of the energy that we use really comes back to the car: they have smaller cars. I mean, you can really sort of look about all the other statistics, and it doesn't really add up to much difference in style of life other than that car.

Well, the only thing I guess I really want to say is I think conservation can help. It certainly is not the answer. But I'd also say that nuclear power is not the answer. Solar energy is not the answer. Americans have tended to, or at least those of us in this state have tended to feel, as Mr. Bauer said, that the technological fix and the answer is right around the corner. We have to conserve until the technologists come up with some alternatives.

Family Environment

I'd just like to close and say that I see the family as the principal environment in which values are learned, consumption patterns are formed, and new social goals evolved. I was socialized at home in an era on a farm, where I was part of the labor force, by saying, "Close the door! Where were you born, in a barn?" and other kinds of quick messages. The family is a great learning unit. They really don't look at themselves as very significant and making very much difference. But I guess I feel that they are, and I hope that our educational program can reflect that and we can help people in their conservation and in their decision to start looking at a cost-benefit analysis of being a consumer.

AGRICULTURE AND FOOD PRODUCTION WORKSHOP

Coordinator: Allen Linster, Vocational Education Consultant-Agriculture, WBVTAE

Resource Person: Ted Brevik, Professor, and Lynndon Brooks, Associate Professor, Agricultural Engineering, University of Wisconsin-Extension, Madison, Wisconsin

Agriculture is in a very critical position in the energy situation. The actual use of energy for the production of agriculture products is relatively small, but it is a very critical part of total energy use because the farmer will be asked by the year 2000 to double his production. Each farmer is now feeding over 53 people. This efficiency has resulted because of the use of petroleum energy and the farmer will need this same type of energy to double his production. We are energy users, and we are particularly petroleum energy users.

It doesn't look like there is the technology to do away with several essential operations that are being done by petroleum energy using vehicles or machines such as field operations. Agriculture utilizes tractors and equipment which are hard to replace. Another area is the use of chemicals and fertilizers. We don't know how to substitute for them without losing efficiency, and in the future, farmers will be called upon to increase production. We have also constructed many buildings which are not energy efficient, but these cannot be replaced very rapidly even if the resources were available, so we are going to have to get along with them.

The farmer and all of us are concerned with food costs. He is concerned with the cost of production which indirectly will be reflected in the cost of food to you. It is important that we also be concerned about the energy that is being used in food processing, farm machinery manufacture, and the manufacture of fertilizer and pesticides. All of these compete for the same energy that is needed for the production of farm crops itself.

As we talk about programs and training needs in the future or immediate needs, I don't think we will be immediately starting training programs for windmill installers or mechanics, or installers of methane gas generators over the hen houses which we don't even have. But agriculture does need some technical skills and information in building construction, both by the farmer and the salesman and by the builders. We are going to have to use the same energy conserving and alternate sources of energy in the farm home and the family that anyone else in society would use. We certainly must find ways to reduce heat loss in our buildings and inefficient operation of some equipment. We must find ways to utilize what is already there. Animal heat, as an example, is an excellent furnace. Buildings should be constructed to use this heat. The heat that is used to cool our milk is often wasted under today's operation and should be used to heat water and other buildings. It has been demonstrated that calves can live in hutches using no other heat source than their bodies. They are more healthy and have similar growth rates as those kept in heated barns.

We need to adopt and adapt to other alternate sources of energy, whenever possible in our operation. Solar heat may be used in drying and heating some of our buildings; the use of electrical instead of petroleum motors is also feasible.

Field equipment and tractor size should be matched to allow for most efficient use of fuel. Low temperature grain drying should be used to reduce fuel usage. The use of timers in drying will allow for synchronizing with suppliers' off-peak electrical energy use periods. Other ways to increase electrical energy efficiency on the farm include:

(1) Having the service entrance of recommended size for the farm.

(2) Adequate lighting of farm buildings and the farmstead.

(3) Having water system of sufficient capacity and repairing all leaky faucets and valves.

(4) Use water heaters of correct size and have temperature properly set for all uses.

(5) Control ventilating fans to stop running when not needed and keeping fans clean.

(6) Use proper size and type of motor appropriate to the application for efficient operation.

Farm homes and heated buildings should be insulated to an R value of 15 in the walls and 25 in the ceiling. Other considerations for efficiency in heating farm buildings would be the use of storm doors and windows. The heating plant should be serviced regularly and drippy hot water faucets should be repaired. All air leakage caused by fans, doors, windows, fireplaces and basements should be reduced.

All tractors and machines should be properly serviced, maintained and operated at proper speed. Elimination of trips to the fields by combining operation should be practiced.

To accomplish this:

(1) There should be a joint educational effort between the VTAE system, University of Wisconsin - Extension, Department of Public Instruction and the agribusiness industry.

(2) There needs to be an information program by these agencies and industries to make people aware of the problems, the alternates and what they can do now; such as was done here at this conference.

(3) There is a need to provide the farmer and his family with technology and information, through our educational programs on the proper use of energy, energy conservation and alternate sources. This will include such things as how to save fuel in the field operation, in tillage practices, in forage harvesting, and drying crops, in home heating, and in farm buildings.

(4) There is a need for in-service training and curriculum development so that our instructors will be able to put the information to use in their classrooms for all of agriculture and agribusiness.

(5) There is not any immediate needs for technicians or new technical education programs. They are perhaps part of the future, but there has to be a great deal of research.

(6) The immediate need is for field service energy education for agriculture and agribusiness for the farm building serviceman, the fertilizer or chemical salesman, the ag mechanic, and the farmer and his family.

(7) There needs to be energy management programs that deal with the economics of energy use and conservation.

TRANSPORTATION WORKSHOP

Coordinator: Otis Mehlberg, Vocational Education Consultant-Trade and Industry, WBVTAE

Resource Person: Richard Taube, Chief, Policy and Goal Analysis Section, Wisconsin Department of Transportation, Madison

Mr. Taube, Chief of the Policy and Goal Analysis Section, Wisconsin Department of Transportation, discussed the Federal and State plans for energy conservation and the occupational impacts these will have in Wisconsin.

Federal Plans

(1) There is no national policy on energy conservation.

(2) There is an attempt to develop a transportation system management for urban transportation. This will utilize existing facilities through better transportation.

(3) Continually developing new fuel efficiency standards for all vehicles.

(4) New technology is being researched to assist in the efficiency and standards area.

(5) Always a battle between efficiency and environment. Seems like you cannot have both.

State Plans

(1) Wisconsin is developing a model plan to include all modes of transportation.

(2) Politics and budget is supporting use of railroads. There is special finance assistance to state and counties to improve railroads and mass transit, about $6.4 million.

(3) To increase amount of money for urban buses, about $7.8 million will be available from segregated highway funds.

(4) There is an additional energy bonus for transportation projects which are directly related to energy conservation.

(5) Regulations - there is a move to ask the Public Service Commission to shift the regulation of rail, bus, and truck to the Department of Transportation.

(6) Policy - the Highway Commission, which establishes road construction, is being asked to shift policy planning responsibility to the Department of Transportation for more uniformity.

Occupational Impact

(1) labor relations - federal rules state that if federal monies are used, the project impact must not put people out of work.

(2) There will be many jobs created for operators, clerical, mechanical, and management skills when changes are implemented. There will be a need for people to coordinate grants, research technicians, and the development of management training courses.

Conserving Energy

To conserve energy in transportation, Wisconsin must:

(1) Use existing facilities, railroads, sea and airports, and highways, rather than build new ones.

(2) Educate the people to use car pools, mass transit, and other forms of transportation.

(3) Develop better management systems for transportation of people and materials.

(4) Develop incentive programs for energy saving ideas and projects.

Transportation uses 25% of all energy consumed in the United States. This gives the people a tremendous amount of latitude for energy saving techniques.

People must not be selfish in their use of transportation. Sharing rides, use of mass transit, and better scheduling is all necessary if we are to conserve energy.

The use of public transportation must be scrutinized so that routes and vehicles can be filled to capacity. It seems that during "crisis" situations flights are cancelled because of poor utilization, but as soon as the "crisis" is lifted, these flights are rescheduled. While bus contractors develop extreme energy saving policies during "crisis" situations, these too are forgotten after the "crisis".

The total transportation system needs to be revitalized. Rules and regualtions concerning the use and abuse, convenience versus conservation, efficiency versus environment, funding for training and research which is meaningful are things that must take immediate priority if we are to accomplish anything to reduce the 25% usage.

CONSTRUCTION TRENDS WORKSHOP

Coordinator: Harlan Klintworth, Vocational Education Consultant-Trade and Industry

Resource Person: Dr. Susumu Karaki, Assoc. Director, Solar Energy Application Laboratory, Colorado State University, Ft. Collins, Colorado

Dr. Karaki provided the workshop participants with basic information about the primary uses of solar energy as it pertains to heating and cooling of residential buildings. He shared his expertise on the relative advantages of solar and the other energy sources known today.

New and Emerging Occupations

The workshop group discussed the potential of new technical occupations that might evolve because of the development of alternative energy resources. It was the consensus of the workshop group that with the present and soon to evolve energy resources, that new occupational trades will not evolve. We should start including course and curriculum changes in our present programs to include energy education as it pertains to any particular occupation.

Energy Programs

Recommendations from the workshop group for initiation and development of occupational education/training programs utilizing technology transfer included such occupations as electrical, carpentry, sheet metal, plumbers, and office persons and salesman, etc. Our schools should start preparing instructors to teach energy technology as it pertains to their occupational area.

Energy sources identified that should be included in occupational training included solar, wind, shale and fossil fules and nuclear. The eduaining should only be included in a program as it pertains to that particular occupation.

Educational programs should be developed for the energy user/consumer. These programs would include energy conservation, cost saving to the consumer, and when the consumer will have to pay more to conserve energy. These programs should be offered to the adult public in general, elementary school children, junior high school children, secondary students - in other words, everybody. This education/training should be done by agencies that service all of these target groups through continuing education, evening classes, extension service as well as our vocational-technical programs.

Energy conservation should be an important factor of consideration in the development and design of systems in our facilities and buildings. Legislation and modifications in regressive building codes are needed changes, to improve energy design practices as they pertain to facilities, both to the buildings and to the systems used in those facilities.

Charge to VTAE

That the VTAE system has a direct and co-responsibility to make a massive attack on energy conservation and the training and retraining of the practioners in the trades area, was a conclusion of the workshop.

TECHNICAL ASSISTANCE TO INDUSTRY WORKSHOP

Coordinator: Robert Bachmann, Vocational Education Consultant-Business and Industry, WBVTAE

Resource Persons: Warren St. John, Allis Chalmers, Milwaukee
Kenneth Knapp, Consolidated Paper, Wisconsin Rapids

Purpose of the Workshop

The purpose of this workshop was to gather information that will help to identify energy use and its occupational impact in order to develop recommendations which will provide a basis to assist VTAE policy makers in determining the system's commitment to the development of occupational and consumer training in energy uses and consumption.

Identified Needs

Expressions and recommendations made by induatry resource people:

1. There is a need for a nationwide and statewide energy policy.
2. Corporations should have corporation policy manuals. In this case an energy policy manual on the use of the utilities of energy equipment, building codes, ventilation, etc.
3. Utilization and application of new ideas, such as:
   a. Application of the heat pump for moving heat in cooling and heating systems
   b. Application of infrared radiation
   c. Utilization of micro processors for monitoring consumption of energy and energy conservation measures
   d. Utilization of waste materials and other by-products for energy
4. Voluntary goals of energy conservation
   a. Begin with stressing obvious energy waste
   b. Fine tune users of energy, i.e., light-heat-power
   c. Install capital improvements as can be justified by return on investment, or survival
5. Conservation and Energy Management
   a. Conservation through prudent practices
   b. Reclamation of energy sources
   c. More efficient use of energy sources for specific applications
   d. Updating of laws, regulations and codes
   e. Instrumentation and monitoring systems

Energy Programming

As the industry resource people view it, the impact of the energy crisis may not create new job titles or emerging occupations. The shifting job assignments will need occupational extension training.

Areas where VTAE can help through training in school or at the work site are:

1. Emphasis on the conservation and control of energy
2. Upgrading of skills in the heating, ventilating and air conditioning industries and trades
3. Understanding of energy terminology and basic environmental controls
4. New and innovative ideas in lighting technology
5. The application of computer science for energy problem solving
6. Application of micro processors for monitoring energy systems
7. The upgrading of job knowledge and skills for maintenance personnel
8. Need for technology transfer in architectural technology, electrical-electronic technology, HVAC technology and new subjects such as solar energy technology
9. Human employee relations assistance for first line supervisors
10. Consumer education for the general public on the conservation of energy
11. Course for boiler operators on fuel conversion which could obsolete their existing boiler operation knowledge
12. Training the trainers in how to establish an energy training program
13. Planning and organizing an energy program for presentation to industry
14. Technical assistance to small business and commercial establishments for energy usage and conservation
15. Understanding impacts and application of laws, regulations and codes for the construction trades.

Policy recommendations

Recommendations for VTAE Policy Statement on Energy:

1. Encourage teacher training institutions to provide upgrading courses to prepare existing VTAE staff to teach "Energy Management"

2. Support financially the development of "Energy Management" seminars, courses and curriculum development through normal budget planning as well as special innovative program funding

3. Review existing technical and vocational programs to include applicable "Energy Management" information

4. Increase efforts to expose the general public to consumer energy use through community services

5. Support efforts to articulate curriculum with elementary and secondary schools to include technical data pertaining to "Energy Management"

6. Encourage industry and VTAE cooperation to exchange technical information and experience through a school - industry personnel exchange.

FAMILY AND PROPERTY MANAGEMENT WORKSHOP

Coordinator: Christine Nickel, Vocational Education Consultant-Home Economics, WBVTAE

Resource Person: Dr. M. Janice Hogan, Associate Professor, Dept. of Family Social Science, University of Minnesota, St. Paul, Minnesota

Dr. Hogan's presentation and the resultant discussion included:

The basic purpose of our economic system is to satisfy consumer needs. The goal of production is to meet these needs. Thus, the consumer is a vital force in determining type and quantity of production.

The family is a high energy user, delineated as follows:

automobile - uses 42% of family's energy	
heating, air conditioning	- 40%
hot water	- 6%
cooking	- 4%
refrigeration	- 4%
miscellaneous	- 3%
lighting	- 1%

In 1960, factory installed air conditioners accounted for 7% of the family's heating and air conditioning energy used, but by 1970, this usuage rose to 69%.

Our economic growth must be tied to a more labor intensive and less energy intensive attitude. Consumers must develop values and attitudes toward driving cars longer, repairing appliances vs built-in obsolescence, others. These attitudes will result in a need for more repair workers. We must develop a support structure.

The group raised the following questions:

Will we want to change our consumption decisions to less energy intensive goods? How will this affect our quality of life? Our values? Can our economy take conserving consumers?

Most of the public discussion has been on producing more energy so we can produce more goods, but desperately little comment has been heard on conservation.

Recommendations:

1. Incorporate energy use and conservation into present VTAE offerings:

   - integrate into all existing courses
   - develop separate courses

2. Staff in-service needed

   -intensive effort needed,
   -a continuous effort. It is everyone's responsibility.

3. In each VTAE district, designate one day in Fall '77 staff in-service program as Energy Day. Develop a state team that will present an energy related program for the day.

4. Help students to become knowledgeable so they can effect public policy which results in change.
   - changing building codes
   - manufactured items
   - processed foods

5. Develop new and emerging curriculums to include energy conservation, and not only finding more conventional energy. So far, people are very apathetic toward energy conservation but are thinking in terms of producing more energy.

6. Find ways to get facts to people so they can make decisions. It is difficult to get true, unbiased or even minimally biased facts.

7. Redirect present educational efforts.

   - examine curriculums in family related and social science courses for inclusion of energy conservation concepts.

   - establish a State Task Force to review these curriculums

   - programs or courses offered by VTAE districts in sales, and in advertising must include facts on energy use and conservation methods and their effects, in addition to techniques of marketing.

8. VTAE decision makers, state and district, should serve as advocates for developing a national energy policy which would impact on energy conservation on a scale comparable to that of the space program.

9. Intensify educational efforts directed toward the family where so many decisions are made. The effort must be directed at the total family, all publics, and cannot succeed if done on an isolated basis.

10. Develop pilot community services programs or seminars to determine community readiness. Educational offerings must be developed.

11. Explore all possible sources of funding for energy use and conservation - at national level, state level, district or local level. Examine district and state priority given to energy use and conservation when preparing budgets.

Conclusion

As a result of our two day's thinking and discussion, workshop members are now thinking of cost in terms of dollars and energy cost. The challenge is to get this type of thinking to become contagious.

INDUSTRIAL AND EDUCATIONAL FACILITIES WORKSHOP

Coordinator: Donald Knudson, Facilities Architect, WBVTAE

Resource Persons: Glenn Groth, President, Sun Store Solar Energy Equipment, Sheboygan, Wisconsin
and
Peter Starkweather, Vice-President, Flad and Associates, Madison, Wisconsin

After listening to some of the other reports, I find that we have many things in common coming out of all of them. Out of the very interesting and lively discussion there were five items that evolved, two of them have been covered basicall by previous speakers. One was the need for staff seminars of basic energy conservation. I think that is possible through in-service meetings. The second was the need for communication between the people scheduling rooms and the physical plant facilties supervisor, particularly on a campus-type development. It is noted that there may be whole buildings kept open for the use of two rooms when there are other buildings required to be open where there would be plenty of space available on Saturday, late afternoon, or evening. Another major point that was brought out was the need for more comprehensive programs in physical plant maintenance. As pointed out, they are not talking about janitors, but mechanics, covering the basics of pneumatics and electrical controls, air balance and industrial energy recovery and conservation. This is not only for the training of new people but for the retraining of existing personnel. There appears to be a very strong need for statewide preventive maintenance training programs with the organization of technical records and back referal, and finally, there appears to be a need for a statewide uniform energy audit in facilities so that direct comparison between similar buildings and uses can be made.

THE ROLE OF VTAE IN TECHNOLOGY TRANSFER

Speaker: C. Phillip Johnson, President, Wisconsin Board of Vocational, Technical and Adult Education

I started out with a rather organized piece of material, but it has since become a bunch of speckled paper filled with notes and observations. When I consider the credentials and accumulated technical knowledge and skills of my audience, I am not sure that anything less than the living book of vocational, technical education, Eugene Lehrmann (State Director of VTAE), should be now before you.

World of Reality

In my response to the summaries given by the other members of the panel here, I think I would like to say that perhaps the basic element is that everybody seemed to stay in the world of reality. I thought this conference might be the type of thing where we might get away from the real world a bit and I didn't think we would see a particularly great accomplishment if we did that. I am pleased to see that we did stay within that parameter.

I was in the agricultural and food conference workshop and we might have gotten away from the immediate questions. We probably could have even gotten into the question of whether, as we use up energy, we would end up eliminating food and consequently wouldn't have any population worries. Or we could have gotten into the exchange of horses and humans for machines, I suppose. But we didn't do that. One other thing I believe we have demonstrated is the fact that there are no simple answers in this world of disorganized confusion.

I think it is unfortunate that this state is only one of the fifty. If it was the whole United States I think I would have a more secure feeling about even what we have done in the past couple of days. Perhaps we are the leading state in total educational capabilities, but Wisconsin needs more educational input I feel, as well as the other states, and a better federal dedication to solving these problems. The very nature of our capitalistic system breeds a nation of exploiters. We are a better exploiter of resources than any other society man has developed. But that isn't all bad. We are also providers. But the best exploiters perhaps turn out to be just naturally the best providers. From time to time this set of advantages might create system weaknesses. We may be facing one now.

Why wait for a crisis?

If our system of government has an outstanding weakness, it is in the manner in which it responds to crisis. Unless economic incentives are present, necessary and remedial actions tend to wait until the crisis is nearly out of hand. The energy crisis is a case in point. We are meeting on this energy issue fully two years after we became interested in it as a State Board, and perhaps a decade after an eminent crisis was known, at least by many people.

Authority and Capability

This delay is explained in many ways, some of them plausible, some of them complex. Certainly, one of the difficulties is the way in which we perceive our roles as governmental agencies. Decisions must be made concerning authority

and capabilities. Some agenices are given authority without an operational delivery system; VTAE has a comprehensive delivery capability but lacks authority beyond its own system and mission, which limits the level at which an issue can be addressed. As a delivery system, we have often played a reactive role, responding to needs certified by other agencies. This is not a sufficient response in coping with crisis. Unless we are willing to accept leadership within our own jurisdiction to cope with crisis, essential responses are not initiated.

Use the garden hose until the fire department arrives

It is not unlike a crowd at a fire waiting for the fire department to arrive. Quite often, prompt action with the available garden hoses has the fire under control by the time the department arrives. It is a case where we cannot wait for great technological breakthroughs, nor can we wait for someone else to assume leadership. Rather, it is a case where we must be accountable in the role that we have been given. I think this point has been made by just about all of the speakers in the last two days. We have waited just about long enough.

VTAE System: Prime Mover in Technology Transfer

Our willingness to move ahead in this effort is based on the realization that the VTAE system is the only system in place with statewide saturation capabilities and with a full spectrum of expertise and programs that interface with the worker and the consumer.

The implementation of new technological developments is our stock in trade. This happens on a business-as-usual basis. Our major and urgent challenge is to modify attitudes and behaviors and to accomplish a change in life-style which will address the energy question and buy time for technological improvement. We do not see ourselves functioning alone but in cooperation with the educational community and with other agenices, industries, and institutions concerned in this area. We do see the VTAE system as a prime mover in the implementation of attitudes, skills, knowledge and behaviors of workers and consumers. While technology transfer has assumed a sophisticated position in bureaucratic jargon and in research, it has historically been the function of the system which is designed so that technical developments reaching levels of practicability flow normally into each discipline.

Continuous Infusion of New Technology

Our vigorous certification program, our in-service activities and the impetus of our professional organizations are geared to keep experts up to date. Our statewide conferences provide a concerted effort in curriculum development. These activities are accomplished, in cooperation with, and with considerable dependence upon, the outstanding research, engineering and higher education resources of the University of Wisconsin.

Environment and Transportation

The situation in related areas of transportation and environment are cases in point. Each year we become more dependent on petrochemicals through the expansion of energy intensive systems in agriculture. It was reported recently that Wisconsin has lost another 2,000 farms over the past year. This has environmental and energy impact, to say nothing of the aggravated crisis in food production looming in the future. Urban sprawl and associated impervious surfaces continue to expand and short-circuit the water cycle, as well as remove our most valuable land from production. I understand that trains are still in litigation to discontinue service, despite the powerful rationale for their redevelopment. Governor Lucey has made reference to this redevelopment need in Wisconsin, but obviously it is another question of national scope and priority.

Must not be exercise in futility

I am aware that I can economize on my personal energy needs to the point of discomfort and even privation, and that my lifetime energy savings would be dissipated by a modern jet forced into a holding pattern for 20-30 minutes because of a situation of a back-up in the tower.

Yet if we all take the measures at hand and if we work for a public policy to reinforce our technology transfer efforts beyond our immediate influence, we can and we will turn society around to the implementation of a sound policy on energy, environment and education. Education, incidentally, coordinated at all levels by each of this state's systems.

VTAE Partner in Implementation

The system moves steadily forward, not on the cutting edge of knowledge, but on the frontiers of adoption and implementation. This is where technological transfer happens. This is the crux of the VTAE mission. Vocational, technical and adult education provide the means for technological implementation. We adapt as new and superior technology develops. We have explored in this conference an extremely important area of technology. We have not moved in timely fashion, since we find ourselves in a predictable crisis. Part of the problem has been the jursidictional confusion and the failure of many citizens and leaders to perceive the essential role of the VTAE sytem.

I hope that it is clear in this conference that we are proceeding in responsible fashion. In order to do this effectively, as this conference has demonstrated, the entire team is needed: the knowledge finders, the knowledge users and those of us concerned with the massive infusion of demonstrated practices to the people of this state, the consumer and the worker.

Appreciation

I would like to thank each and everyone of you for participating in this conference. You have made it meaningful and successful. I would like to extend a special thanks to Mr. Burt Zien, my colleague on the Board; he is a great exploiter, if I may use that word in the sense I explained earlier. He was the prime mover in the development of this conference; and certainly a special thank you to our Co-Chairmen, Sherman Ansell and Arnold Potthast and their able committee and to all the participants.

CONCLUDING REMARKS

Speaker: Sherman D. Ansell, Conference Chairman; and Vocational Education Consultant-Research, WBVTAE

Just a few remarks for final wrap-up. The committee would like to thank all of the resource people who took the time to help us in identifying the problem and looking for solutions. We do hope to have some type of summary or concluding document to this conference and it will be sent to all the participants of this conference whose names and addresses we have.

Four Phase Plan

This conference is the first phase of a four phase plan developed by the Energy Programming Committee of the State Board. It is designed for a broad range of expertise and backgrounds, instructors, program supervisors and coordinators, top level administrators, and representatives of business and industry as well as experts in various fields of energy. The outcomes of this phase will be used as one source for identifying policy needs and curriculum in phases two and three.

The Wingspread Conference on Energy and Occupational Education is designed as the second of the plan to present a broader perspective of energy-related policy needs to State and District members of policy making boards and the top level administrators of the Wisconsin VTAE system.

The third phase will be a week-long Energy Curriculum Workshop at UW-Stout which has as its primary purpose the upgrade and update training of classroom instructors and the development of classroom materials and actual laboratory activities.

The final phase and goal of the plan is for local VTAE districts to offer energy education opportunities to the public in a timely and effective manner. The intent of the plan is for a significant amount of programming to begin next Fall.

Leadership Needed

This is a leadership conference and we need your continued support if the energy programming plan is going to be successful. The VTAE people will have to provide that leadership within their district staffs, in working with peers throughout the VTAE system, and through professional contacts outside the system. I might also point out that the fourth phase of this plan is really the most important; and the responsibility for that phase is with the districts next year, or even before, to start offering courses, workshops, seminars, demonstrations, and other offerings to deliver our educational product to the people of this state to cause and facilitate technology transfer in energy related technology. Efforts of industrial people also are needed, to let us know what the actual manpower training needs are and to provide us feedback on our product, our students, to let us know if they are doing the job, and not just let us slide by if this product does not meet their expectation.

Thank you all for coming, have a safe journey home. We are finishing a little earlier than scheduled, so you can drive a little bit slower and save gasoline energy. Thank you all for your active participation.